D9124

Security Systems

EN | Operation & Installation Guide
Addressable 24 VDC Control Panel

BOSCH

Notice

The material and instructions covered in this guide were carefully checked for accuracy and are presumed to be reliable. However, Bosch Security Systems assumes no responsibility for inaccuracies and reserves the right to modify and revise this guide without notice.

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c/o Technical Marketing Department
130 Perinton Parkway
Fairport, NY 14450-9199 USA

Documentation Conventions

Type Styles Used in this Document

The following type styles identify important items and objects described in this guide.

Bold text - Indicates an important fact to note.

Italicized text - Refers to another part of this document or another document entirely. It can also symbolize names of user-created records.

`Courier text` - Indicates text that appears on the Remote Programming Software (RPS), command center, keypad, or an internal printer.

[CAPITALIZED TEXT] - Indicates the name of a specific key to press.

Warnings, Cautions, and Important Notes

This document contains the following formatted warnings, cautions, and important notes concerning the installation and/or programming of the unit.

Warning Notice – Warns of the possibility of physical damage to the operator and/or equipment. Used when there is an increase risk of physical damage to the operator (severe injury or death) or equipment (as in destruction of physical components).

Caution Notice – Cautions the operator about physical damage to the program and/or equipment.

Important Note – Heed these notes for successful operation and programming. Helpful tips and/or shortcuts can be included here.

Contents

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Tables

Notes:

1. Introduction

This guide addresses the operation and installation of the D9124 (D9412GLTB) Control Panel **only**, and should not be used in conjunction with other panels including the D9112B1 and D9112LTB-EX.

1.2 Related Documents

A comprehensive list of all documents (with part numbers) directly related to the D9124 Control Panel is provided in *Table 1*. Throughout this manual, references are made to these documents. If it is necessary to obtain one (or more) of these documents, please contact Bosch Security Systems Technical Support and request the document by its corresponding part number.

Table 1: Related Documentation

Document Name	Part Number
Literature Pack	
D9124 Operation & Installation Guide (this document)	39352
D9412G/D7412G Program Entry Guide	47775
D9124 Program Record Sheet	50098
D9124 Release Notes	50097
D1256 Fire System User's Guide	71-06991-000
SIA Information Booklet on Security Alarm Systems	71-05834-000
Technogram: Smoke Detectors Compatible with the D9000/D7000 Series Control/Communicators	33284
ZONEX Labels	74-04252-000
ZONEX Labels	74-04252-003
Point Chart Label*	79-06660-000
RPS Operations Manual	38849
D6600 Computer Interface Manual	39963

* A Point Chart Label is required for fire systems with verification points. You must install the point chart label for fire or combined fire/burglary systems using verification points.

Use the *Program Record Sheet* to gather the information you need to fill out the Point Chart Label. Install the label inside the enclosure door. To avoid smearing your entries on the chart, use the label's peel off backing to press the label in place.

1.3 Document Organization

This document is divided into twelve sections and two appendices as summarized in *Table 2*.

1.4 FCC Rules

1.4.1 Part 15

This equipment was tested and complies with the limits for a Class B digital device, pursuant to Part 15 of the Federal Communication Commission (FCC) rules. These limits are designed to provide reasonable protection against harmful interference in a residential installation.

This equipment generates, uses, and can radiate radio frequency energy; and if not installed in accordance with the instructions, may cause harmful interference to radio communications. There is no guarantee that interference will not occur in a particular installation. If this equipment does cause harmful interference to radio or television reception, which can be determined by turning the equipment on and off, the user is encouraged to try to correct the interference by one or more of the following measures:

1. Reorienting or relocating the receiving antenna
2. Increasing the separation between the equipment and the receiver
3. Connecting the equipment into an outlet on a circuit different from that to which the receiver is connected
4. Consulting the dealer or an experienced radio/TV technician for help

1.4.2 Part 68

This equipment complies with Part 68 of FCC rules. The label contents include the FCC registration number and Ringer Equivalence Number (REN). If requested, this information must be provided to the telephone company.

The Bosch Security Systems D9124 24 VDC Addressable Fire System is registered for connection to the public telephone network using an RJ38X or RJ31X jack.

The REN determines the number of devices that can be connected to the telephone line. Excessive devices on the telephone line can result in one or more of those devices not ringing in response to an incoming call. In most, but not all areas, the sum of the RENs should not exceed five. To confirm the number of devices you can connect to the line (as determined by the RENs) for the calling area, contact the telephone company.

If the D9124 System harms the telephone network, the telephone company will notify you or the customer as soon as possible. Also, you will be advised of your right to file a complaint with the FCC.

Table 2: D9124 Operation and Installation Guide Organization

Section	Description
1	**Introduction –** Information about the structure and contents of this guide (this section).
2	**Overview –** Overview of the 9124 Control Panel, including operational specifications, standards, and new features.
3	**Installation –** Guide to the installation of the system with references to detailed instructions in later sections.
4	**Command Centers/Annunciation Devices –** Describes the available command centers and their installation, wiring, programming, and operation.
5	**Indicating Circuit –** Information on available 24 VDC horns, bells, and strobes.
6	**ZONEX, Addressable Points –** Information on the ZONEX points and their parameters including the installation, wiring, and testing of POPEX modules and POPITs.
7	**Power Supplies –** Information on supervision of the primary and secondary power supplies with instructions on choosing and connecting secondary supplies.
8	**Power Outputs –** Information on the available output power and the terminal connections required to use that power.
9	**Telephone Connections –** Information on connecting the phone line(s) and programming the control panel for reporting over the phone line(s).
10	**Programming –** Instructions on programming the control panel.
11	**Testing the System –** Description of and instructions for the Fire Test and the Service Walk Test.
12	**Troubleshooting –** Solutions to a variety of commonly encountered problems.
Appendix	**Description**
A	**Determining Battery Requirements –** Worksheets for determining the total power required, battery life, and standby current requirements for common system applications including NFPA 72 Fire Alarm Applications.
B	**D9142 24 VDC Power Supply –** Description and specifications for the D9142 power supply including information on battery supervision and status reporting.

The telephone company might make changes in its facilities, equipment, operations, or procedures that can affect the operation of the equipment. If this happens, the telephone company will provide advance notice in order for you to make the necessary modifications in order to maintain uninterrupted service.

If you have trouble with the D9124 Control Panel, contact Bosch Security Systems Customer Service for repair and/or warranty information. If the trouble is causing harm to the telephone network, the telephone company might ask you remove the equipment from the network until the problem is resolved. Do not make repairs yourself; doing so voids your warranty.

This equipment cannot be used on public coin service provided by the telephone company. Connection to Party Line service is subject to state tariffs. (Contact your state public utilities commission for information.)

FCC Registration Number: AJ9MUL-46532-AL-E
Ringer Equivalence: 0.1B
Service Center in USA: National Repair Center
130 Perinton Parkway
Fairport, NY 14450
(585) 223-4220

1.5 UL/NFPA Notices

UL Listed for NFPA 72 Central Station, Local (non-coded), Auxiliary, Remote Station (DACT), Household Fire Warning Systems. The D9124 System was approved by FM, NYC-MEA, and CSFM.

The D9124 System is also listed for certificated central station (DACT) Grade B and Grade C burglary applications. Grade B systems require a local bell. The D1255 Command Center must meet the UL Central Burglary requirements.

All references to NFPA and related requirements are based on compliance with the 1993 edition of NFPA 72, National Fire Alarm Code. Since installation specifications are nearly always based upon a specific edition of a standard which was legally adopted by the Authority Having Jurisdiction (AHJ), earlier editions of NFPA standards generally apply. Consult the appropriate AHJ for confirmation.

Installation limits fall under the jurisdiction of the local authority.

Initiating Circuits

The list below identifies the types of initiating circuits the control panel is approved for and their abbreviations:

- Automatic (A)
- Manual (M)
- Waterflow (W)
- Sprinkler Supervisory (SS)

2. Overview

2.1 Specifications

Table 3: Specifications

Voltage Input (Power Supply)	Primary: 16.5 VAC/24 VAC Secondary for Panel: Two 12 VDC, 7 Ah sealed lead-acid rechargeable batteries or one (or two) 12 VDC, 17.2 Ah sealed lead-acid rechargeable batteries. Secondary for Devices: Two 12 VDC, 7 Ah to 38 Ah sealed lead-acid rechargeable batteries.
D9412GLTB Current Requirements	Idle: 200 mA Transmitting: 500 mA
Power Outputs	All external connections are power limited except battery terminals. 24 VDC Power Supply: 4 A maximum. 24 VDC Power Output (from D9142) Terminals 5, 7, and 9 (motherboard): 1.8 A maximum at 24 VDC per terminal. Combined 24 VDC outputs not to exceed 4 A total. 12 VDC Power Output from Terminal 1 (motherboard) and D9412GLTB Terminal 3: 1.4 A maximum at 12 VDC per terminal. Combined 12 VDC outputs not to exceed 1.4 A total.
Telephone Connections	Connection: RJ31X or RJ38X jack can interface with the D9124. Two Telco Lines: Bosch Security Systems D928 Dual Phone Line Module provided for two phone line service. Supervision supplied by the control panel.
Environmental Considerations	Operating Temperature: 0°C to +50°C (+32°F to +122°F) Relative Humidity: 5% to 85% at +30°C (+86°F) non-condensing

2.2 Standard Features

2.2.1 Protective Points

As shipped, the Bosch Security Systems D9124 Addressable 24 VDC System provides eight on-board points built into the control panel. On-board points 7 and 8 support a 24 V power supply and notification circuits, and are not for other uses. As shipped, the control panel can support 119 added Point of Protection Input Transponders (POPITs). If you use an additional D8125 Point of Protection Expander (POPEX) Module, another 119 points can be added for a maximum total of 246 (8+119+119).

Each point requires an addressable device for individual annunciation such as the D462, D291S, D291M, or a POPIT. Each point is programmed separately with options to custom-fit the protection to your installation. Point programming parameters determine the system's response to open and shorted conditions on the sensor loop.

2.2.2 Communicator

The D9124 Addressable 24 VDC System uses a built-in digital communicator to send reports to the receiver. Up to four receiver phone numbers can be programmed. You can program the control panel to send reports to primary, backup, and duplicate phone destinations. The control panel transmits reports in Modem or BFSK format. Use the Modem format to provide full system information to the receiver.

The D9124 System connects to two D166 RJ31X (or RJ38X) jacks for phone line seizure. Connection to the jacks complies with FCC regulations for using the public telephone network. The D9124 System uses the built-in D928 Dual Phone Line Switcher to supervise two phone lines.

2.2.3 24 VDC Outputs

The D9124 Control Panel provides a 24 VDC power supply rated at 4 A. The operating voltage range of this output is between 18.9 VDC and 28 VDC. All Bosch Security Systems 24 V indicating devices are compatible with this power supply. For other indicating and initiating devices, refer to the manufacturer's *Installation Instructions* . Verify the devices' **minimum** operating voltage is equal to or greater than 18.9 VDC and the **maximum** operating voltage is equal to or less than 28 VDC.

24 V indicating and initiating devices with a minimum operating voltage less than 18.9 VDC or a maximum operating voltage greater than 28 VDC can be damaged or fail to operate.

2.2.4 Time and Date

You need a D1255 Command Center or the D5500 RPS to set the time and date.

2.2.5 Event Logger

The D9124 System stores up to 1000 system events and event modifiers in its Event Log. Event modifiers add information about an event to the log. Some events are always followed by a modifier. For example, the D9124 systems adds at least two items to the log each time it reports a phone line failure or keypad failure. It sends the event name and then an event modifier showing the number of the failed device.

All events and their modifiers are stored even if the D9124 System does not send a report for them. You can view the log at a D1256 Fire Command Center, print it locally using the D9131A Parallel Printer Interface and a parallel printer, or upload it to a D5500 Remote Programming Software (RPS).

2.2.6 Skeds (Scheduled Events)

The Skeds feature of the D9124 System uses the control panel's internal clock and calendar. Each Sked is programmed for a time and either a day of the week schedule or a date of the year schedule. You can change the time a Sked occurs if it is programmed for time editing and if a D1255/D1255R Command Center is connected to the system. Editing functions are not available with a D1256 Command Center.

2.2.7 Local Printer

The D9124 System can print events recorded on a standard parallel printer using the D9131A Parallel Printer Interface. The D9131A uses an 80-character print format that includes the time, date, account number, event, point number, and point text. The 80-character format also provides system status information.

2.2.8 EMI/Lightning Transient Protection

The D9124 System maintains Bosch Security Systems' high level of quality and field dependability. Its design significantly reduces electromagnetic interference and malfunction generally caused by lightning.

2.2.9 Programming

Use the Bosch Security Systems D5200 Programmer or the D5500 RPS to program the D9124 System. Refer to the *D9124 Release Notes* for the required product handlers for the D5200 Programmers. See *Section 10.0 Programming* for parameters. The D9124 System comes from the factory with a partial program already loaded. Therefore, you need to complete this program for the D9124 System to function. Copy the program from a new D9124 System. Save and lock the copied program in your D5200 or RPS.

2.2.10 Other Features

The D9124 System includes the following programmable features:

- Supervision of AC (primary power), battery (secondary power), Auxiliary Power Outputs, ZONEX and Serial Device Interface (SDI) buses, Central Processing Unit (CPU), up to three printers, and telephone lines
- Automatic System Test Reports
- Remote access for programming, diagnostics, and log uploads using the Bosch Security Systems D5500 RPS
- Fire alarm verification and programmable alarm output

2.3 New Features in D9412G/D7412G

2.3.1 Introduction

The D9412G is intended to eventually replace the D9412 and D9112; the D7412G will eventually replace the D7412 and D7212. The suffix "G" indicates the control panel's ability to detect ground fault conditions. All other software feature sets available in the 9000 Series Control Panels remain the same in the D9412G/D7412G.

2.3.2 Ground Fault Detect

For the D9412G/D7412G to detect ground fault conditions, the earth ground terminal on the control panels were electrically isolated from all other terminals. A ground fault detect enable switch (S4) was added to the control panel and located under Terminal 10, Earth Ground. For more information on the operation of this function, see *Section 3.4.2 Ground Fault Detect Enable.*

2.3.3 Added Feature When Using Ground Fault Detect

When Ground Fault Detect is enabled (S4 closed), Points 1 to 8 can be used for non-powered fire-initiating devices like heat detectors, four-wire smoke detectors, and pull stations.

A D125B Powered Loop Interface or a D129 Dual Class A Interface Module is no longer required when connecting non-powered fire-initiating devices to Points 1 through 8.

2.3.4 NetCom Function

The D6600 NetCom System supports data network communications. NetCom allows the D6600 Receiver to connect to various network topologies, specifically ethernet and token ring, and to process messages to and from most networks using TCP/IP protocols. Connection to a data network can be implemented using the COM4 and/or a COM1 connection from the D6600 Receiver to the D6680 Network Adapter. Reports from alarm control panels through phone lines or ethernet and token ring data networks can be sent to the D6600 receiver and onto the central station automation software and/or the network printer using LAN or WAN. Alarm control panels can be monitored on the network for their status.

3. Installation

3.1 Before You Begin

3.1.1 Become Familiar with the Literature

Before you install the D9124 Addressable 24 VDC System, be familiar with the operation of RPS and with the literature provided in the literature pack (see *Table 1* for a list of this literature).

3.1.2 Become Familiar with the Components

The D9124 Addressable 24 VDC System is shipped to you in three separate packages.

- Package one includes the D9412GLTB Control Panel.
- Package two includes the D9101 Enclosure.
- Package three includes the D9100 Accessory Module Carrier, D1601 Transformer, transformer enclosure, and literature pack.

The components are included with your D9124 Addressable 24 VDC System are:

- One D9412GLTB Control Panel (without terminal blocks)
- One D9101 enclosure assembly
- One D9100 Accessory Module Carrier including:
  - One D8125 POPEX Module
  - Two D192C or D192G Indicating Circuit Supervision Modules
  - One literature pack
  - One D928 Dual Phone Line Switcher Module (with cables)
  - One D1256 Fire Command Center
  - One D9142 24 VDC power supply
  - One D1601 hard-wired dual (16.5 VAC/24 VAC) secondary transformer
  - One motherboard
  - One wiring harness
  - One extra wiring harness for D8125 POPEX Module
  - Two 560 Ω resistors (for D192C or D192G Modules)
  - Two D161 dual modular telephone cords
  - One D162 dual modular telephone cord

3.1.3 Determine the Battery Requirements

You also need two D126 12 V, 7 Ah batteries or one (or two) D1218 12 V, 17.2 Ah or 18.0 Ah batteries for standby power for the D9412GLTB, command centers, and modules.

When connecting two D1218 Batteries to the control panel, both must have the same capacity (use two 17.2 Ah batteries or two 18 Ah batteries).

Two additional batteries (D126 12 V, 7 Ah) are needed to provide standby 24 V power for the 24 V devices connected to the D9124 System. If more than 7 Ah capacity is needed, use a UL Listed enclosure for additional batteries. Mount the battery enclosure next to the D9124. Use conduit to connect the two enclosures. These batteries are not provided, but are available from Bosch Security Systems (also contact Bosch Security Systems for other enclosures and power supplies). See *Appendix A: Determining Battery Requirements* for information about meeting minimum battery requirements.

All battery lead connections are not power limited.

Use only sealed lead/acid batteries. The power supplies in the D9124 system are designed to operate with sealed lead/acid batteries. Using other types of batteries can cause damage to the D9124 system power supplies.

3.2 Mounting the D9101 Enclosure

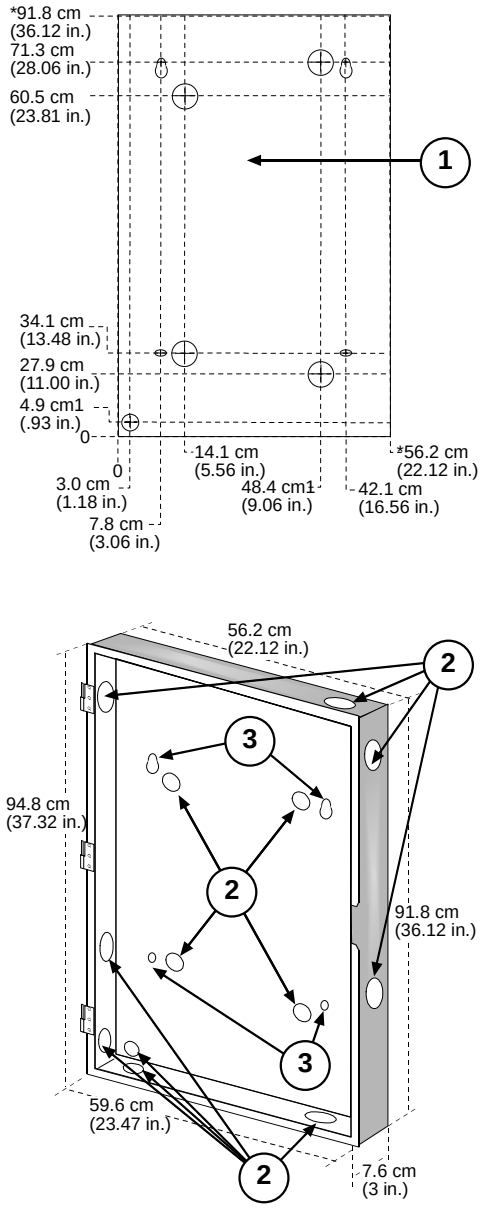
When attaching the enclosure to a surface, use mounting hardware capable of supporting at least 33.6 kg (74 lbs.) of equipment. You may need to mount a plywood sheet on the wall to support the weight of the control panel and batteries.

The enclosure door is removable. To make mounting the D9124 system easier, open the door and slide it up and off the hinges.

The enclosure door has a lock and can be tampered. The smoke-gray window in the enclosure door has a different lock to see the D1256 Fire Command Center display and access the keypad without opening the enclosure. The window lock uses the same key as the Bosch Security Systems manual pull stations.

The enclosure can be flush or surface mounted. See *Figures 1* and *2*.

Figure 1: Enclosure



** Measurements include enclosure thickness.*

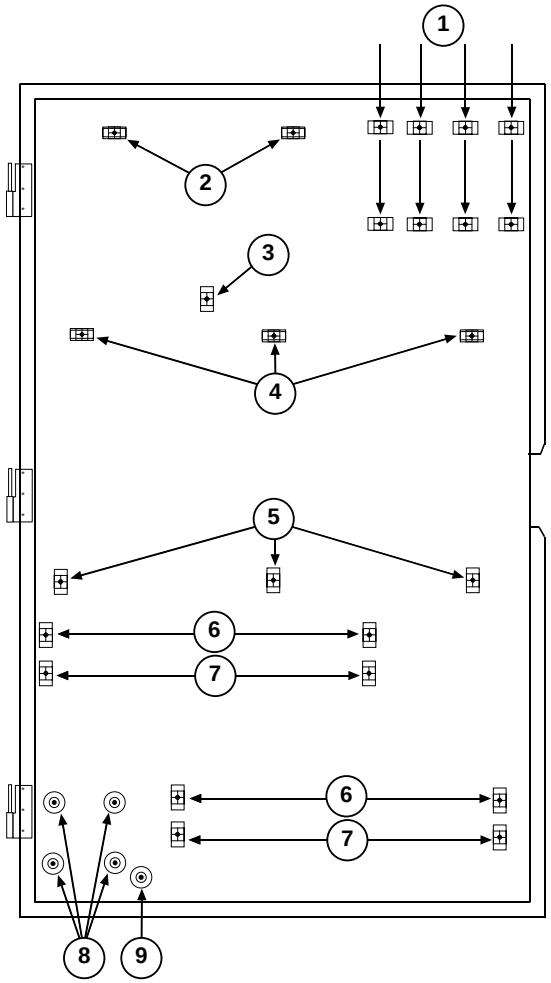
1 - Back of enclosure (inside view)

Mounting holes and knockout pattern:

2 - Knockout

3 - Mounting hole

Figure 2: Mounting Locations



1 - Additional module mounting locations (use D138 mounting brackets)

2 - Control panel mounting hinge

3 - Mounting flange

4 - Module carrier mounting hinge

5 - Module carrier mounting flange

6 - Battery shelf

7 - Mounting flange

8 - Transformer mounting location

9 - Earth ground stud

3.2.1 Flush Mounting

1. Cut and frame an opening measuring 56.75 cm x 92.25 cm x 7.75 cm (22.25 in. x 36.25 in. x 3 in.) to accept the enclosure base box. See *Figure 1*.
2. Remove the door from the enclosure.
3. Remove the necessary knockouts for external connections. See *Figure 1*.
4. Mount the enclosure in the framed opening using all four mounting holes.
5. Run the necessary wiring throughout the premises and pull the wires into the enclosure. A single knockout is provided at the top right side of the enclosure. If you punch other holes, do not let them interfere with the component mounting locations.

3.2.2 Surface Mounting

1. Remove the door from the enclosure.
2. Remove the necessary knockouts for external connections. See *Figure 1*.
3. Mount the enclosure in the desired location using all four mounting holes.
4. Run the necessary wiring throughout the premises and pull the wires into the enclosure. A single knockout is provided at the top right side of the enclosure. If you punch other holes, do not to let them interfere with the component mounting locations.

3.3 Safety

3.3.1 D9124 and High Voltage

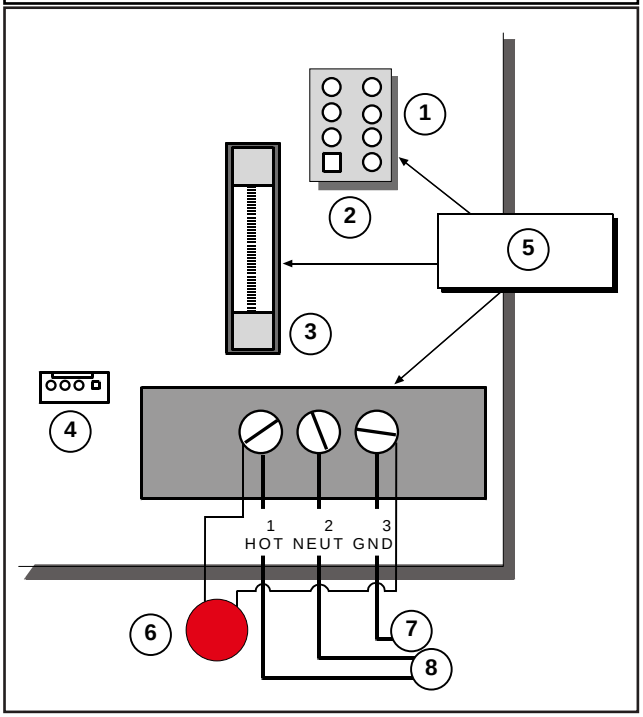
The D9124 System connects directly to a 20 A, dedicated, single-phase circuit breaker. The high voltages at these connections are extremely dangerous. Only licensed electricians should make or service these connections.

3.3.2 Safety Precautions While Handling High Voltage

High voltage is present at the AC power input terminals, Fuse F1, and connector J8 located in the lower right corner of the D9142 power supply (see *Figure 3*).

Always use the dedicated circuit breaker to remove 120 VAC before removing the covers to the fuse or terminal block. Cover the fuse and terminals after making connections or testing these connections.

Figure 3: High Voltage on D9142



1 - XFRM

2 - J8

3 - F1

4 - J5

5 - DANGER! 120 VAC

6 - Metal Oxide Varistor (MOV). Attach MOV across HOT and GND of 110 V power input.

7 - To 120 VAC

8 - High voltage source

3.3.3 Ground the System First

Be sure to ground the system before completing any wiring (see *Section 3.4 Connecting the Earth Ground*).

3.3.4 Safety Precautions While Handling Batteries

Wear rubber gloves and safety goggles while connecting batteries together. Mixing batteries of different capacities or mixing batteries from multiple manufacturers is not recommended.

Unplug the D9142 battery connector J7 before attaching or removing wires at the D9142 power supply terminals.

Refer to battery manufacturer instructions for further information about batteries and applicable safety precautions.

3.4 Connecting the Earth Ground

3.4.1 Wire Connections to Earth Ground Stud

High voltage is present. Lock out the circuit breaker before proceeding.

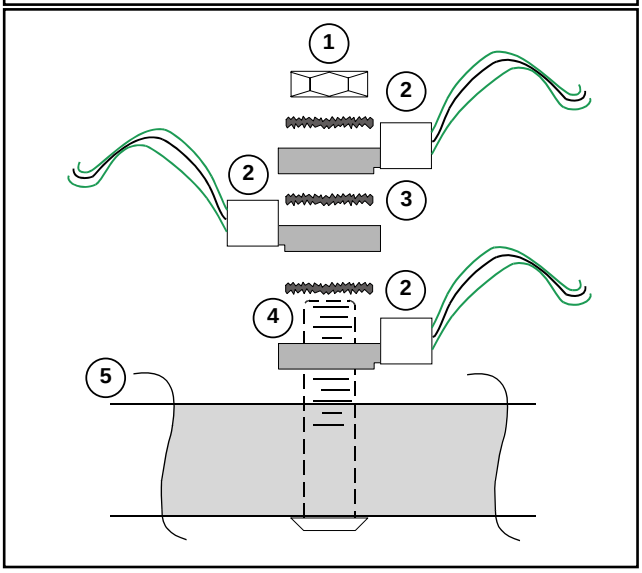
Make all connections to the 120 VAC terminals as directed by NEC 70.

For safety and to help prevent damage from electrostatic charges or other transient electrical surges, you must first ground the system before making any other connections. Before connecting the green wire from the 120 VAC service, crimp a connector to the end of it.

Refer to *Figures 2* and *4* to place objects on the Earth Ground stud in the following order:

1. Place a star washer on the stud.
2. Slip the green wire from the 120 VAC service onto the star washer on the stud.
3. Place the hex nut on the stud and tighten firmly.
4. Repeat Steps 1 through 3 for the two green wires in wiring harness J1 on the upper battery shelf.

Figure 4: Wire Connection to Earth Ground Stud



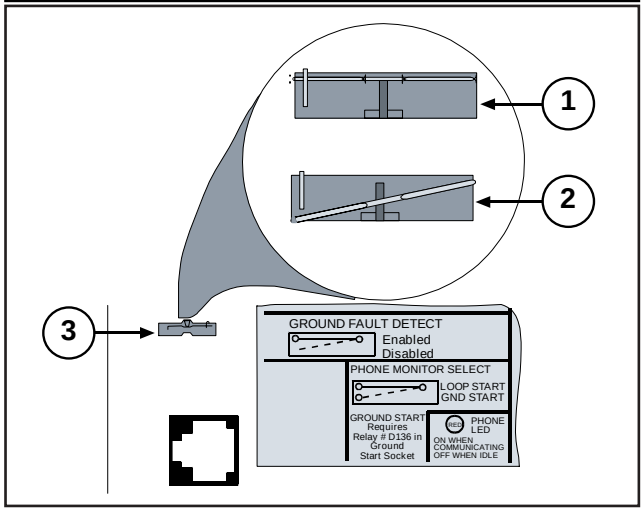
1 - Nut
2 - Lug
3 - Star washer
4 - Stud
5 - Sheet metal panel

3.4.2 Ground Fault Detect Enable

Ground fault detect capability is available only on firmware versions 6.10 or higher.

Ground fault is defined as "a circuit impedance to earth ground of approximately 95 kΩ or less." The control panel detects a ground fault on Terminals 1 to 9 and Terminals 11 to 32 if the Ground Fault Detect Enable jumper (S4) shown in *Figure 6* is locked (closed) and a non-zero value is entered in Area 5 Silent Alarm Relay. (Refer to the *D9412G/D7412G Program Entry Guide*.) However, the D9124 defaults to 128.

Figure 5: Ground Fault Detect



1 - With S4 closed, control panel detects ground faults.

2 - With S4 open, control panel does not detect ground faults.

3 - Ground fault detect enable (S4)

When the jumper is in the unlocked (open) position, the panel does not detect ground fault conditions. If a ground fault condition occurs, the command centers display SERVC GND FAULT and the control panel transmits a Trouble Report Ground Fault Area 1 (Modem IIIa^2 format only). For the control panel to detect a ground fault condition, it must see the ground fault for at least 30 consecutive seconds. When the control panel recognizes the ground fault condition is corrected, a Restoral Report is sent. For the restoral condition to be met, the ground fault must be corrected for 5 seconds to 45 seconds consecutively.

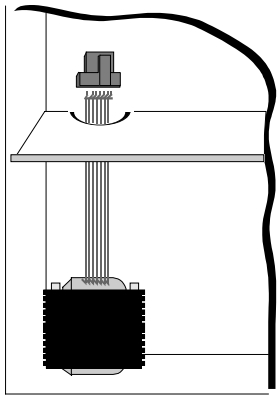
The D9124 Fire Alarm Control Panel logs and prints a Ground Fault Event as a Trouble Point 256.

3.5 Installing the D1601 Transformer

Only route AC conduit into the enclosure housing the D1601 Transformer.

The D1601 is a 120 VAC, 16.5 V/24 VAC dual secondary transformer. It is the primary power supply for the control panel and initiating devices of the D9124 System. Install the transformer in the lower left corner of the D9101 enclosure (see *Figure 6*).

Figure 6: D1601 Installation



If the 120 VAC cabling for the transformer is already installed, make sure the dedicated circuit breaker for the system is off and route the 120 VAC cables away from the transformer mounting studs.

To install the D1601 Transformer:

1. Remove the hardware taped to the side of the transformer. Do not leave any part of the plastic bag or tape behind.
2. Place the star washers over the transformer studs in the lower left corner of the D9101 enclosure (see *Figure 4).*
3. Place the transformer over the star washers on the four transformer mounting studs. Make sure the transformer cables are routed up as shown in *Figure 6.*
4. Place the washers over the transformer mounting brackets.
5. Place the nuts over the washers and tighten securely into place.

3.6 Connecting the 120 VAC Power Input

Only use a licensed electrician to make 120 VAC connections to the D9124 System. The electrician should make all connections conforming to NEC 70 and connect the D9124 System to a suitable ground connection.

To connect the 120 VAC service to the D9124:

1. If the 120 VAC cabling is already installed, go to Step 5. If the 120 VAC cabling is not already installed, go to Step 2.
2. Make sure the incoming high voltage (120 VAC) from the D9124 is disconnected.

Turn off the circuit breaker before connecting the 120 VAC to the system. Leaving the circuit breaker on can cause injury or death by electrocution.

3. Remove the knockout cover on the lower left side of the D9101 Enclosure and install the appropriate hardware for connection to conduit.
4. Pull the 120 VAC power wires through the conduit hardware installed in the knockout, and into the transformer enclosure.
5. Refer to *Section 3.4 Connecting the Earth Ground.* Using appropriate hardware, connect wires to the flying leads from connector J1 as shown in *Table 4.*

Table 4: High Voltage (120 V) Connections to the D9124 System

Wire From 120 V Service	Connect to D9124 System On
Green	Ground stud below D1601
White	White (on J1)
Black	Black (on J1)

6. After the AC power is tied in, install the red metal oxide varistor across the HOT and GND Terminals of the 110 VAC Power Input of the D9142.

3.7 Installing Battery Shelves and Transformer Cover

Battery and transformer cables route through notches in the upper battery shelf and the right side of the transformer cover. The mounting hardware for the battery shelf is taped to the shelf. The mounting hardware for the transformer cover is taped to the cover.

To route cables and install the hardware:

1. Insert the connector for wire harness J1 into the upper battery shelf so that the leads hang down from the bottom of the shelf.
2. Loosely screw the four screws (provided with each shelf) into the four shelf mounting holes. See *Figure 2* for locations.
3. Route the cable connected to the transformer **up**, and the battery cables **down** through the notch at the back of the upper battery shelf. All wire connections to J1 stay below the battery shelf.
4. Push the upper battery shelf back into place and align the four holes in the shelf with the screws. Slip the shelf down over the screws. Do **not** tighten the screws yet.
5. Install the bottom battery shelf by loosely driving the screws into the mounting flanges, slipping the shelf over the screws, and tightening the screws.
6. Replace the protective cover over the transformer while routing the battery cables through the notch on the right side of the transformer enclosure cover. Make sure the shrink wrapped circuit breaker is **outside** the notch so it hangs over the lower battery shelf.
7. Plug the transformer cable into J8 located on the lower left-hand side of the D9142 power supply.
8. Inspect the notch in the battery shelf to verify the transformer and battery cables route through and have not slipped outside of the notch as you tighten the screws on the battery shelf.
9. Verify the covers are securely installed over fuse F1 and TB1, and connector P8 is plugged into J8 on the D9142 power supply.

3.8 Mounting the Components

3.8.1 D9100 Accessory Module Carrier

The D9100 Accessory Module Carrier includes the following installed modules:

- One D8125 POPEX Module
- Two D192C or D192G Indicating Circuit Supervision Modules
- One D928 Dual Phone Line Switcher
- One motherboard
- One D9142 24 VDC power supply

The D9142 was modified to be compatible with the ground fault capability of a D9412GLTB. The modified D9142 unit can be identified by lot number 0200C or higher. The lot number is located in the upper right-hand corner of the control panel.

The Accessory Module Carrier also includes a D1256 Fire Command Center. The right-hand side of the carrier faceplate has three cutaway sections (see *Figure 7*). The one nearest the D1256 allows you to see the D928 LEDs. The next two provide easy access to the alarm switches on the D192C or D192G Modules.

The wiring harness is assembled at the factory, and terminal blocks only need to be snapped into place in the designated locations on the D9412GLTB.

Hang the accessory module carrier on the three mounting hinges shown in *Figure 2*. Then secure the three screws attached in the bottom three mounting holes.

3.8.2 Control Panel

Hang the control panel on the two mounting hinges shown in *Figure 2*. Secure the screw attached to the panel in the mounting flange.

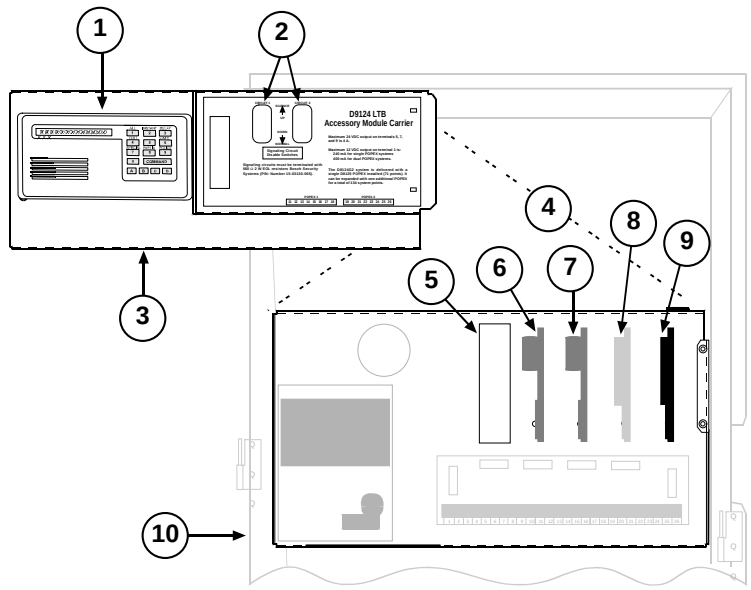
3.8.3 Additional Modules

The D9101 enclosure provides four locations for mounting additional modules like the D192C or D192G Bell Circuit Supervision Module, D125B Powered Loop Interface, D129 Dual Class A Initiating Module, or D8130 Release Modules on D138 mounting brackets. See *Figure 2* for mounting locations.

Additional modules affect standby battery calculations. Due to increased power consumption, you might need to increase the size of the standby batteries attached to the D9412GLTB or D9142 power supply. See *Appendix A: Determining Battery Requirements* to determine the type and number of batteries you need for your application.

Additional D8125 POPEX Module. If you are installing an additional D8125 POPEX Module, install it in the D9100 Accessory Carrier Module (*Figure 7*) as described in *Section 6.2 Connecting the Additional D8125 Module*.

Figure 7: Modules Installed on the Accessory Module Carrier



1 - D1256 Command Center
2 - Cutaways for D192C/G Modules
3 - Cutaway for D928
4 - D192C/G Indicating Circuit Supervision Modules
5 - D928 Dual Phone Line Switcher
6 - D192C/G #1
7 - D192C/G #2
8 - D8125 POPEX #1 slot (module installed)
9 - D8125 POPEX #2 slot (optional)
10 - D9142 power supply

3.9 Connecting Cables Between D9124 System Components

Before you start, review *Section 3.3 Safety.*

Do not turn AC power on until instructed to do so.

1. Make sure the dedicated AC power source is off. For information about power specifications, refer to *Section 7.0 Power Supplies.*
2. Connect the four terminal blocks to their locations on the D9412GLTB, making sure each terminal block clicks firmly into place.
3. Connect the flat ribbon cable between connector J4 on the D928 and connector J2 on the D9412GLTB. For more information about the D928, see *Section 9.0 Telephone Connections.*

Do not force the cable in the wrong way. The ends of the flat ribbon cable are keyed so they only plug in one way.

4. If this is a communicating fire system, plug one end of a D161 (20 cm [8 in.]) or D162 (5 cm [2 in.]) modular phone cord into J1 on the D928. Plug the other end into the RJ31X (D166) for the primary phone line and then plug one end of a D161 or D162 phone cord into J2 on the D928. Plug the other end into the RJ31X (D166) for the secondary phone line.
5. Connect flying lead P1 into J1 (in the upper battery shelf).
6. Verify transformer cable P8 is connected to J8 on the lower left side of the D9142 power supply.

3.10 Wiring Additional Modules

Table 5 shows additional modules you can install with the D9124 System, and where to connect module cables to the D9124 System. Connect additional modules (except for D8125 POPEX Modules) to the D9124 System as shown in *Table 5*. Refer to the module's *Installation Instructions* for remote device wiring. *Table 5* shows only the connections to the D9124 System.

Route cables above the D9100 Accessory Module Carrier to locations on the D9412GLTB. Space is provided at the right side of the accessory module carrier to route cables around and below the accessory carrier to destinations on the motherboard and the D9142 power supply. Use wire ties to bundle multiple cables.

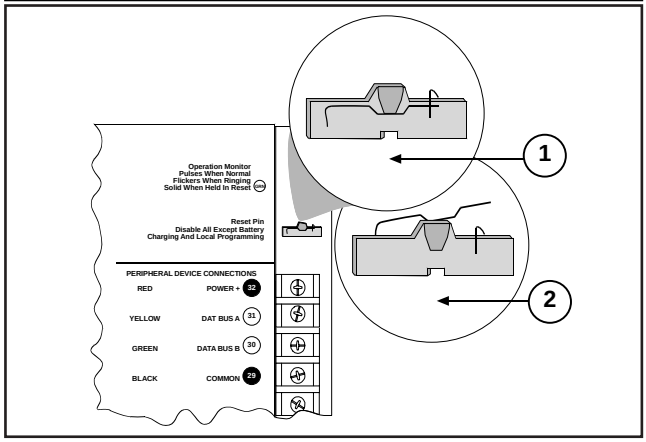
Do not pass cables through the D9100 Accessory Module Carrier. The carrier is designed to protect enclosed modules from EMI or other interference that can affect module operation. Route all additional module cables around the outside of the Accessory Module Carrier.

3.11 Turning on the Power

Before turning on the power, lock the Reset Pin (*Figure 8*) on the D9412GLTB. Locking the Reset Pin disables the D9124 System. The panel ignores the command centers and points while disabled. After power is connected, `CALL FOR SERVICE` appears in command center displays while the reset pin is locked down.

1. Lock the Reset Pin on the D9412GLTB (*Figure 8*).
2. Connect the two sets of batteries. Refer to *Installing the 12 V Standby Source Batteries* and *Installing the 24 V Standby Source Batteries* in *Section 7.0 Power Supplies*.
3. Turn the AC power on. The batteries begin to charge, even though the D9412GLTB is still disabled. The yellow LED on the D9412GLTB illuminates if the batteries require charging.

Figure 8: Reset Pin



1 - Reset pin locked (closed)

2 - Reset pin normal (open)

Table 5: Wiring Additional Modules

D9124 Terminals	D125B Terminal	D127 Terminal	D129 Terminal	D192C/G Terminal	D8129 Terminal	D8130 Terminal
Motherboard TB1 1 (12 VDC)	-	8	6	AUX	AUX	3
Motherboard TB1 2 (COM)	4 and 10	1 and 3	8	COM	GND	1
Motherboard TB1 3 (Data Out)	-	-	-	-	-	-
Motherboard TB1 4 (Data In)	-	-	-	-	-	-
Motherboard TB1 5 (Switched 24 VDC)	1	-	-	-	-	-
Motherboard TB1 6 (COM)	5	-	7	-	-	-
D9412GLTB TB2/3 Points 1 to 6	2 and/or 3	-	5 and/or 9	SUPV ZONE	-	4
D9412GLTB TB1 6 (Alarm Output)	-	9 or 10	-	ALARM TRIG	-	2
D9412GLTB ZONEX OUT	-	-	-	-	ZN1 OUT or ZN2 OUT	

4. Command Centers and Annunciation Devices

4.1 Descriptions

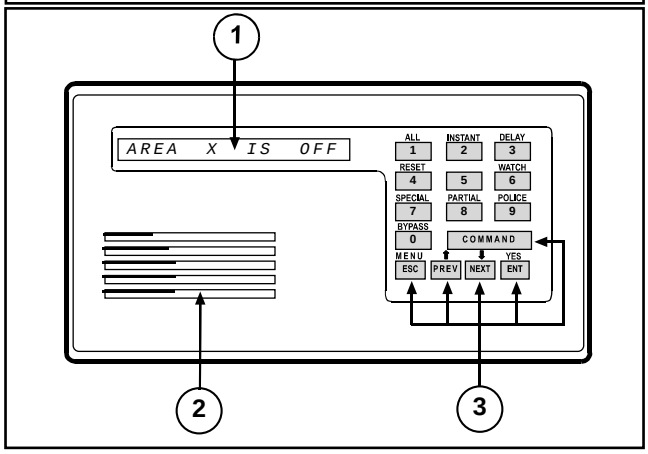
4.1.1 D1255 and D1255R Command Centers

The D1255 Command Center (*Figure 9*) is a digital system control station with a 16-character alphanumeric display. It provides system control for the D9124 System. Housed in white plastic, it displays text identifying specific initiating and supervisory devices.

The D1255 Keypad contains the number keys 0 to 9, a command key, and four menu keys. These keys allow you to passcode protect selected system control functions for installations that are more publicly exposed. You can mount the D1255 on the D56 Surface Mount Box. You can mount the D1255 on the D56 Surface Mount Box.

The D1255R has the same features as the D1255, but it is housed in red plastic. You can mount the D1255R on the D56R Red Surface Mount Box.

Figure 9: D1255/D1255R Command Center



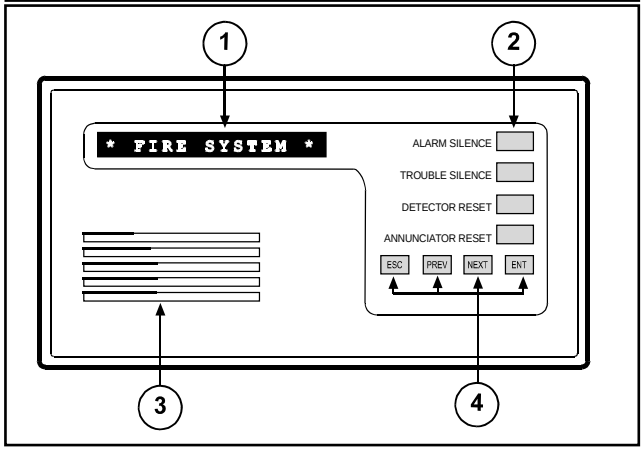
1 - Alphanumeric display
2 - Siren/speaker
3 - Function keys

4.1.2 D1256 Fire Command Center

The D1256 Fire Command Center (*Figure 10*) is a digital fire system control station with a 16-character alphanumeric display. It provides system control for the D9124 System. Housed in red plastic, it displays text identifying specific initiating and supervisory devices.

The D9100 Accessory Module includes an installed D1256 Fire Command Center made operational by the default programming shipped with the control panel. If you do not use the default programming, you must make the installed D1256 operational. (Refer to the *D1256/D1257 Installation Instructions* [P/N: 74-06925-000]. For the D1256 installed in the D9100 Module only, disregard the instructions for mounting and wiring the D1256/D1257 and follow the instructions for programming the control panel.)

Figure 10: D1256 Command Center



1 - Alphanumeric display
2 - Function keys
3 - Siren/speaker
4 - Navigation keys

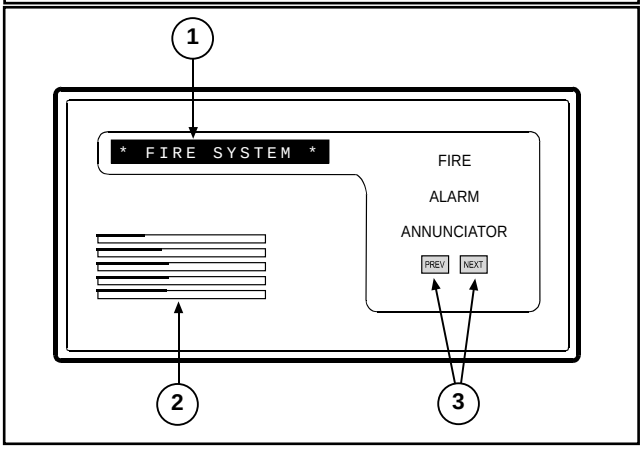
4.1.3 D1257 Remote Fire Annunciator

The D1257 Remote Fire Annunciator (*Figure 11*) displays system information. It can be mounted in areas of public access because it does not provide system control. It displays text identifying specific initiating and supervisory devices.

Do not mount command centers or annunciators where they will be exposed to sunlight. Sunlight can damage internal components and interfere with display visibility. Do not mount command centers or annunciators in wet or moist locations.

There is a maximum number of command centers. You can connect up to eight supervised or 32 unsupervised command centers to the D9124 system. The available power, number of supervised command centers, and number of areas you intend to use affect the total number of command centers you can connect to the D9124 system.

Figure 11: D1257 Remote Fire Annunciator



1 - Alphanumeric display

2 - Sounder

3 - Navigation keys

4.2 D1256/D1257 Specifications

Table 6: D1256/D1257 Specifications

Power	Nominal: 12 VDC supplied by the control panel.
Current Requirements	Idle: 104 mA Maximum: 206 mA, with command center illuminated and warning tone ON
Wiring	Four-wire expansion cable supplies Data In, Data Out, +12 VDC, and Common
Dimensions (H x W x D)	11.6 cm x 20.7 cm x 2.1 cm (4.56 in. x 8.15 in. x 0.816 in.)
Environmental Considerations	Temperature: 0°C to +50°C (+32°F to +122°F) Relative Humidity: 5% to 85% at +30°C (+86°F) non-condensing

4.3 Installing Command Centers and Annunicators

A four-wire flying lead is required for the data and power connections between the D1255, D1255R, D1256, and motherboard. They come with a wiring assembly consisting of four color-coded flying leads and a female, four-pin connector plug at one end.

1. Using a small, flat-bladed screwdriver, gently push in the two bottom tabs of the command center enclosure cover. As you push back the tabs, lift the command center cover away from the base.
2. Set the address settings as shown in *Table 7*. For supervised command centers, assign only one to each address.

Table 7: Command Center Address Settings

Switch	Address 1	2	3	4	5	6	7	8
1	ON	OFF	ON	OFF	ON	OFF	ON	OFF
2	ON	ON	OFF	OFF	ON	ON	OFF	OFF
3	ON	ON	ON	ON	OFF	OFF	OFF	OFF
4	Leave ON – Do **not** use							
5	Encoding Tone ON/OFF							
6	Leave ON – Factory Test							

3. Turn the command center over and plug in the wiring connector through the opening in the back of the enclosure base.
4. Mount the command center base in the desired location and secure it using the mounting holes inside the enclosure base.
5. Replace the cover. Align and insert the top two tabs of the enclosure cover into the top two tab slots of the enclosure base. Hold the top edges of the enclosure cover and base in position. Push the tabs inward and press the enclosure and cover together until the cover snaps into place.
6. Press each key on the keypad toward the top of the command center to ensure proper alignment and operation of each key through the mating keypad faceplate openings.
7. Install the locked cover according to the instructions provided.

The remote command centers have lockable covers. Protect remote command centers with a locked cover such as the Safety Technology's 6550 Wide Body Keypad Protector.

8. Connect the flying leads of the wiring assembly (provided) to the wires from the panel (see *Table 8*).

Table 8: Command Center Connections

Wire Color	Motherboard Terminal
Red	1 +12 VDC
Black	2 Common
Yellow	3 Serial Data Out
Green	4 Serial Data In

Switching the green and yellow wires affects other command centers.

Incorrectly connecting the green wire from the command center to the motherboard Terminal 4 and the yellow wire to Terminal 3, causes other command centers connected to the control panel to go blank and/or sound random tones.

You can connect a maximum of 4.6 km (15,000 ft.) of 22 AWG (0.8 mm) wire **for all command centers and printer modules combined** to the data bus, Terminal 3, and Terminal 4 on the motherboard. You can connect parallel wire runs from the D9124 System to each device, run wire device to device, or combine the two. However, limit the individual wire runs to command centers to 0.61 km (2000 ft.).

Extra power is needed for more command centers and annunciators. The D1255, D1255R, D1256, and D1257 each draw 104 mA when idle. Each draws 206 mA with the back lighting for the keys illuminated and the sounder activated. Review *Section 7.0 Power Supplies* and *Appendix A.1 Auxiliary Current and Standby Battery Requirements* to determine the total power output requirements for your system.

You might need to add one or more UL Listed power supplies for the number of command centers you want to use.

D9124 and the additional power supplies must share COMMON.

When using an additional power supply to power command centers, the common from the additional power supply must connect to both command centers' common and the common on the D9412GLTB board.
A stand-alone power supply powering any device connected to the D9124 must also be connected to a common terminal on the D9124.

Notes:

5. Indicating Circuit (24 VDC Horns/Strobes/Bells)

5.1 Description

The D192C or D192G Indicating Circuit Module supervises the wiring from the control panel to remote alarm indicating devices like horns, strobes, and bells. Wiring is supervised for open, shorted, or grounded circuit faults.

Signaling devices must:

- be polarized (DC).
- match the voltage rating of the alarm power supply (D9142).
- not exceed the current rating of the alarm power supply (D9142).
- not exceed 1.8 A on motherboard Terminals 7 or 9 when combined.

Total output power for the D9124 system must not exceed 4 A. The total output power for auxiliary power (Terminal 5) and 24 VDC indicating circuits (Terminals 7 and 9) must not exceed 4 A. Exceeding 4 A overloads the D9142 power supply. See *A.1.2 Calculations for 24 VDC Devices* to determine total output requirements.

5.2 Operation

During normal operation, the indicating circuit is supervised for incorrectly installed devices, opens, shorts, and grounds. If any of these conditions are detected, the control panel indicates a Trouble condition at the command center. You can program the control panel to report the condition to the central station.

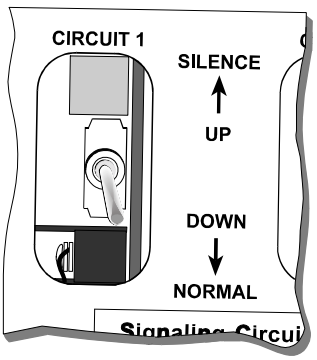
When the control panel detects an alarm, the alarm output circuit triggers the D192C or D192G to supply circuit power from the power supply.

To provide supervision, install the 560 Ω, 2 W EOL resistor (P/N: 15-03130-005) beyond the last indicating device. Two resistors are supplied in the literature package.

5.3 Silence Switch

The D192C or D192G has a toggle switch to disable the fire alarm indicating devices while you test the control panel (*Figure 12*). When this switch is toggled up in the SILENCE position, the D192C or D192G presents a short circuit to Point 7, causing a Trouble response.

Figure 12: D192/D192G Bell Silence Switch



Notes:

6. ZONEX, Addressable Points

6.1 Description

You can use POPIT Modules to provide up to 238 off-board points, bringing the total number of points the D9124 System can monitor to 246. Each off-board point requires a POPIT Module.

POPITs connect to supervised two-wire data expansion loops run from POPIT to POPIT throughout the premises (*Figure 14*). Data expansion loops connect to the motherboard. The motherboard connects to the POPEX Module. POPEX Modules connect to the point bus on the control panel.

You can connect up to four data expansion loops to one D8125 input at the motherboard. Data Loops 1 to 4 connect to the D8125 POPEX 1 input on the motherboard (Terminals 11 through 18). Data Loops 5 to 8 connect to the D8125 POPEX 2 input at the motherboard (Terminals 19 through 26).

If a POPIT is disconnected from the expansion loop, a trouble message appears immediately. See the *D9412G/ D7412G Program Entry Guide* for programming options.

Placing a short on the data expansion loop generates a PT Bus Trouble Report. The control panel sees all points on the shorted expansion loop as shorted and responds according to point programming. The fire points respond locally as a Trouble condition and transmit Missing Fire Reports if programmed during this condition.

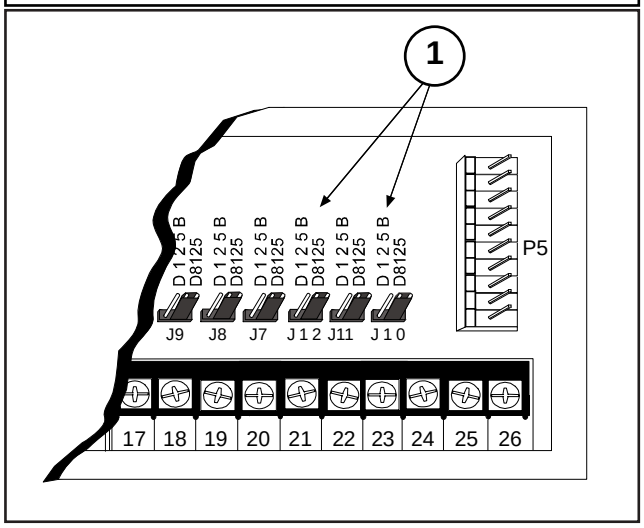
POPIT Modules monitor their sensor loops for three conditions: Loop Normal, Loop Open, and Loop Shorted. They report these three conditions to the control panel.

The D9124 uses point programming to interpret the sensor loop information reported by the POPITs and makes the appropriate system response. Initiation devices connect to each POPIT. The POPIT sensor loop can supervise an unlimited number of initiation devices. Certain applications can limit the number of initiation devices. Consult the appropriate NFPA standards.

The POPIT comes in a tampered enclosure (D9127T) or an untampered enclosure (D9127U).

Verify the proper setting of motherboard jumpers: Make sure the jumpers above Terminals 18 to 24 on the motherboard are in the D8125 position (*Figure 13*).

Figure 13: D8125 Jumper Setting



1 - Jumpers set in the D8125 position.

6.1.1 POPEX/POPIT Configurations

With the D8125 POPEX Module, you can:

- use D8125 POPEX 1, data loops 1 to 4 (Terminals 11 to 18) on the motherboard (*Figure 14*).
- install a maximum of 119 POPITs (Points 9 to 127).
- use Points 7 and 8 for power supply and initiation circuit supervision. POPITs are not required for these functions.

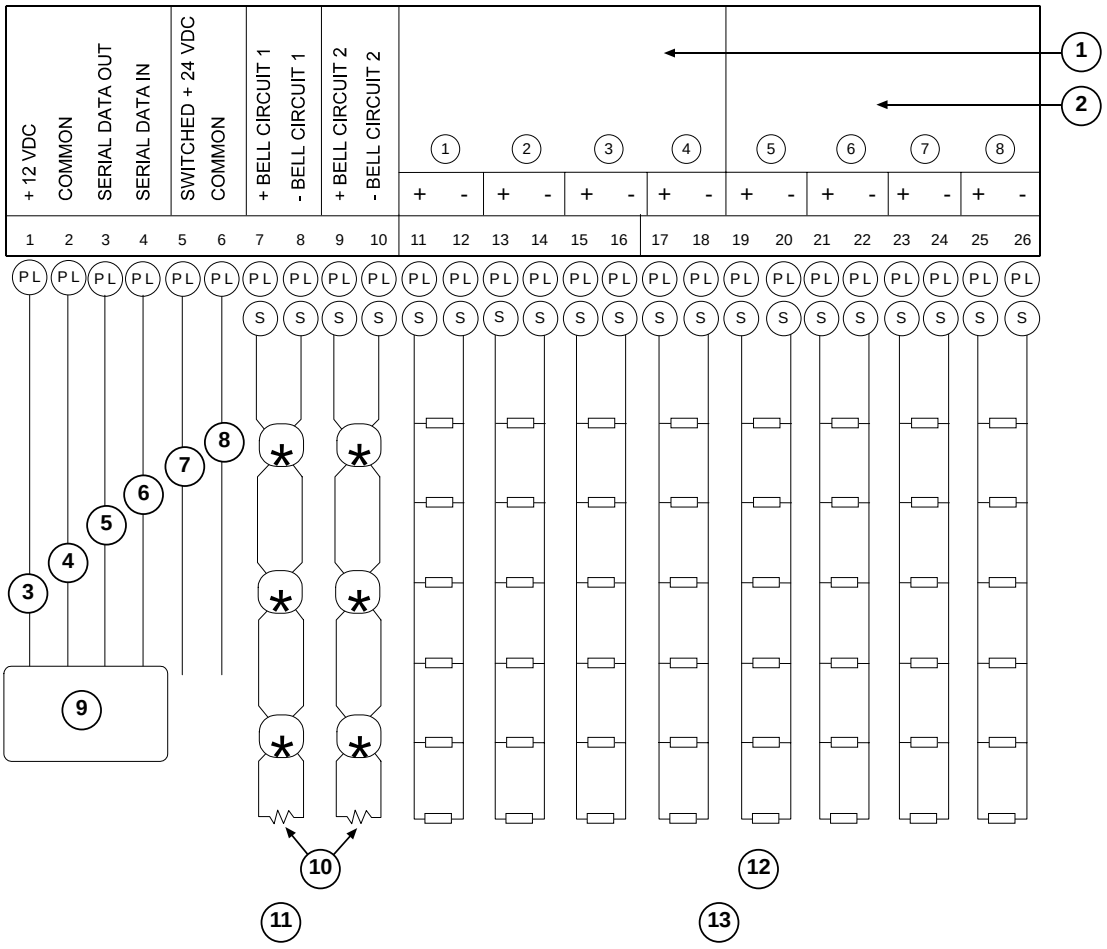
With an additional D8125 POPEX Module, you can:

- use D8125 POPEX 2, data loops 5 to 8 (Terminals 19 to 26) on the motherboard (see *Figure 14*).
- install an additional 119 POPITs (Points 129 to 247) for a maximum of 238 POPITs in the system.

6.2 Connecting the Additional D8125 Module

1. Mount the module to a D138 mounting bracket, using only the three screws provided.
2. Mount this assembly in the empty slot next to the other modules on the Accessory Module Carrier. Use the orientation of the other modules as a guide. See *Figure 2*.
3. Connect the clip-on end of the extra wiring harness to the far right connector (J5) on the motherboard.
4. Connect the hanging wires to the D8125 Module as shown in *Table 9*.

Figure 14: Connecting Field Wiring to Motherboard



1 - D8125 POPEX #1 data loops
2 - D8125 POPEX #2 data loops (optional)
3 - Red
4 - Black
5 - Yellow
6 - Green
7 - Smoke detector power (+)
8 - Smoke detector power (-)
9 - D1255, D1256, D1257 (or other fire annunciators)
10 - 560 Ω, 2W EOL resistor (P/N: 15-03130-005)
11 - Style W circuit
12 - POPIT loops (maximum number = 238)
13 - Style 3.5 circuit

Table 9: D8125 Wiring

Wire Color	D8125 Terminal	
Gray	-	TB2 - 2
Violet	+	TB2 - 3
Black	GND	TB1 - 1
Orange	OUT	TB1 – 2
Green	IN	TB1 – 3
Red	AUX	TB1 – 4

6.3 Selecting POPIT Point Assignments

Off-board points are numbered 9 to 127 and 129 to 247.

> The D9124 System reserves points 128 to 248 for internal use to supervise the data loops.

You must connect POPITs for points 129 to 247 to the expansion loops connected to D8125 POPEX #2.

Addresses for each POPIT assign the module to a point number. POPIT address settings are in *Section 6.3.1 POPIT Labels* and the *Point Assignments* section of the *D9124 Program Record Sheet* (*Figure 15*).

6.3.1 POPIT Labels

Four sheets of peel-off POPIT labels are supplied with the D9124 System. Use the sheet marked *Vertical Grid for D8125 POPEX #1* for points 9 to 127. Use the sheet marked *Vertical Grid for D8125 POPEX #2* for points 129 to 247.

Each label has two parts. Place the smaller part (containing only the point number) on the POPIT terminal block. Place the larger part (containing address settings) on the POPIT cover. Set the addresses and cover the POPIT.

Do not program two POPITs for the same point number. After you program all the points, perform a Fire Test or Service Walk Test. See *Section 11.0 Testing the System* for instructions. If a point does not test properly, check the programming for a duplicated address.

6.3.2 Program Record Sheet

Column One: Contains the address settings for the POPITs. Addresses are numbered 0 to 6, left to right. Set addresses whose number appears in the ON position. Set addresses with a dash (-) in the OFF position (*Figure 15).*

Column Two: Contains the translation of the point number into the D8112 ZONEX format. See *Point/User Flag* in the *9000MAIN* Module of the *D9412G/D7412G Program Entry Guide* for an explanation of this feature.

Column Three: Contains the point number as it appears at the command centers.

Column Four: Contains the point index. See the *Point Index* Module in the *D9412G/D7412G Program Entry Guide* for an explanation of the point index.

Column Five: Shows the area to which the point is assigned.

Column Six: Shows the Debounce Count for the point. See P### Debounce in the *Point Assignments* Module of the *D9412G/D7412G Program Entry Guide.*

Column Seven: Shows the BFSK report code, the point number reported for this point when the control panel is using the BFSK format.

Column Eight: Contains the text displayed at command centers for the point. The text is transmitted to the receiver when the control panel is using the Modem IIIa^2 format.

Figure 15: Program Record Sheet

RADXPNTS Handler Default values are shown in ( ) or in **bold**

Point Assignments (001 through 040)

POPIT Switch Setting	Trans-lation	Point #	Point Index	Area Assign	Debounce	BFSK/ Relay	Custom Point Text
	100	001	(3) _ _	(1) ___	(2) _____	(1) ____	P1 FIRE _____
	200	002	(1) _ _	(1) ___	(2) _____	(2) ____	P2 PANIC _____
	300	003	(25) _ _	(1) ___	(2) _____	(3) ____	P3 DELAY _____
	400	004	(13) _ _	(1) ___	(2) _____	(4) ____	P4 FOLLOW _____
	500	005	(7) _ _	(1) ___	(2) _____	(5) ____	P5 INSTANT _____
	600	006	(7) _ _	(1) ___	(2) _____	(6) ____	P6 INSTANT _____
	700	007	(7) _ _	(1) ___	(2) _____	(7) ____	P7 INSTANT _____
	800	008	(7) _ _	(1) ___	(2) _____	(8) ____	P8 INSTANT _____

6.4 Installing POPITs

Each POPIT comes with an installation card. You should be familiar with the POPIT installation card before attempting to install POPITS.

6.4.1 Routing the Data Cable

The two-wire data expansion loop connects POPIT Modules assigned to a single D8125 POPEX. You can connect up to four data loops to one D8125 at the motherboard. Data Loops 1 to 4 connect to D8125 POPEX #1. Data Loops 5 to 8 connect to D8125 POPEX #2 (*Figure 14*).

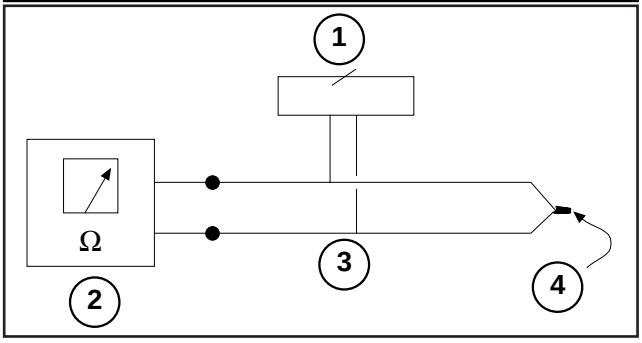
Total resistance of the D8125 POPEX Data Loops cannot exceed 60 Ω regardless of wire gauge or distance used. To estimate resistance, refer to *Table 10*.

Table 10: Resistance by Wire Size

Wire Size		Ω per 305 m (1000 ft.)
AWG	mm	
12	2.3	1.62
14	1.8	2.58
16	1.5	4.09
18	1.2	6.51
20	1.0	10.40
22	0.8	16.50

To determine total resistance, tie the ends of the D8125 POPEX Data Loops together to eliminate POPIT resistance (*Figure 16*). After measuring resistance, untie the ends of the D8125 POPEX Data Loops.

Figure 16: Checking Resistance of Data Loops



1 - POPIT *3 - 60 Ω maximum*
2 - Ohmmeter *4 - Short ends together (testing only)*

Electromagnetic interference (EMI) may cause problems. If you suspect EMI is a problem, refer to *Section 12.9 EMI on Long Wire Runs*.

6.4.2 Connect POPITS to the Data Cable

You do not need to wire POPIT Modules in any order on the motherboard D8125 POPEX Data Expansion Loop. An address setting on each POPIT (*Section 6.3 Selecting POPIT Point Assignments*) identifies the point of protection, regardless of its physical location on the data cable. POPIT Modules must be mounted **at least 7.6 cm (3 in.) apart** and using **at least 15.2 cm (6 in.) of wire**. This prevents the tamper magnets from interfering with each other.

Connect POPIT Modules to the data loop in parallel. Do not T-tap POPIT Data Loops together (*Figure 17*).

1. Connect the positive (+) data terminal from one POPIT to the positive (+) data terminal on the next POPIT.
2. Connect the negative (-) data terminal from one POPIT to the negative (-) data terminal on the next POPIT.
3. Repeat Steps 1 and 2 to connect all POPITs on the same D8125 POPEX Data Loop.

6.4.3 Connecting the D291S and D291M Addressable Smoke Detector Bases

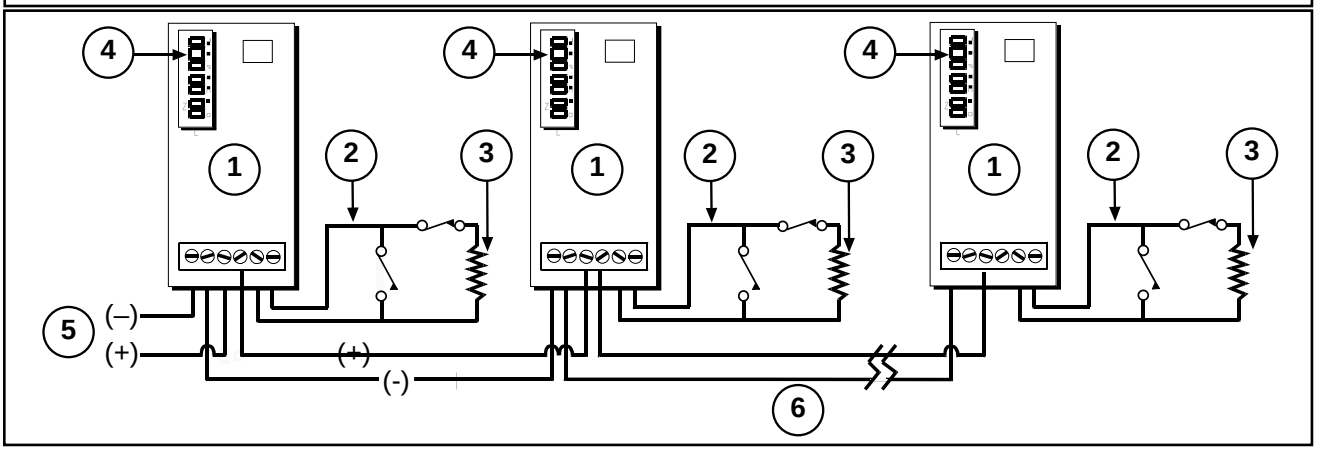
To prevent damage to the POPEX module, wire smoke detector bases when the data cable is disconnected from the motherboard. Before connecting detector wiring to the control panel, meter each wire to ground to check for continuity, and meter between each wire for continuity. You should have no grounds or shorts between any of the wires. Put the detector heads on after you have metered all the wiring (*Figure 18*).

Before beginning the installation, refer to the *Operation and Installation Guides* for these detectors.

6.5 Connecting Data Loops to Terminals on the Motherboard

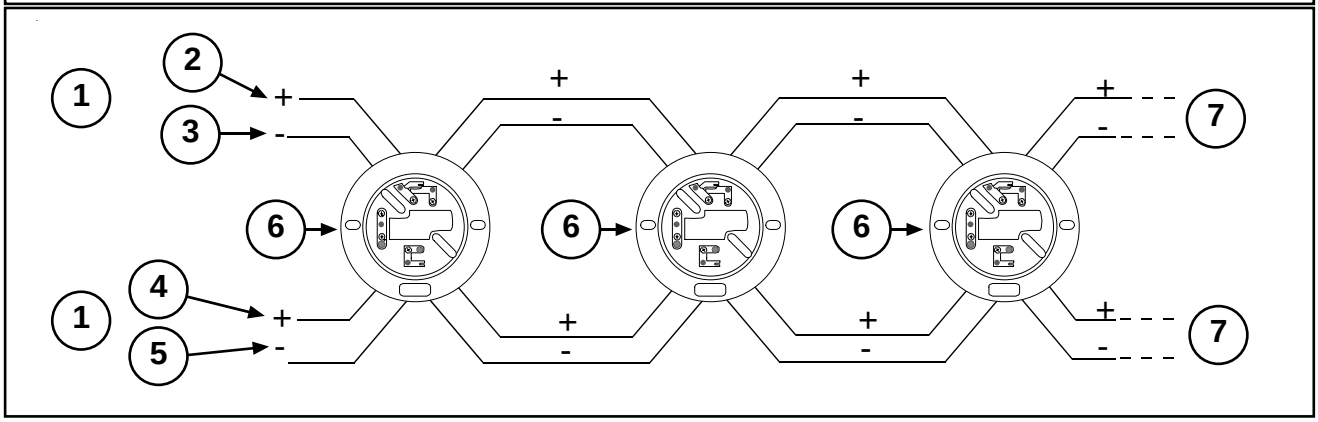
D8125 POPEX modules must have their own data expansion loops. The motherboard provides two sets of D8125 POPEX Data Loops. POPIT modules assigned to D8125 POPEX #1 cannot be placed on the D8125 POPEX #2 Data Loop. Limit the data loops returning to the motherboard to a maximum of four data loop runs for each POPEX you install. See *Table 11*.

Figure 17: Connecting POPITs to Data Cable



1 - D9127U/T
2 - POPIT sensor loop (typically up to 119 places)
3 - 33 kΩ EOL resistor (typically up to 119 places)
4 - POPIT switch block (typically up to 119 places)
5 - To motherboard D8125 POPEX data loop
6 - Up to 119 POPITs

Figure 18: Connecting Devices to the Motherboard



1 - Motherboard
2 - Switched + 24 VDC
3 - Common
4 - Data loop positive
5 - Data loop negative
6 - D291M/D291S base
7 - To next

Table 11: Data Loops and POPITs

D8125 POPEX #1	D8125 POPEX #2
Data Loops 1 to 4	Data Loops 5 to 8
Points 9 to 127	Points 129 to 247

6.6 Wiring the POPIT Sensor Loop

POPIT Modules monitor their sensor loops for three conditions: Loop Normal, Loop Open, and Loop Shorted. They report these three conditions to the D9124 System.

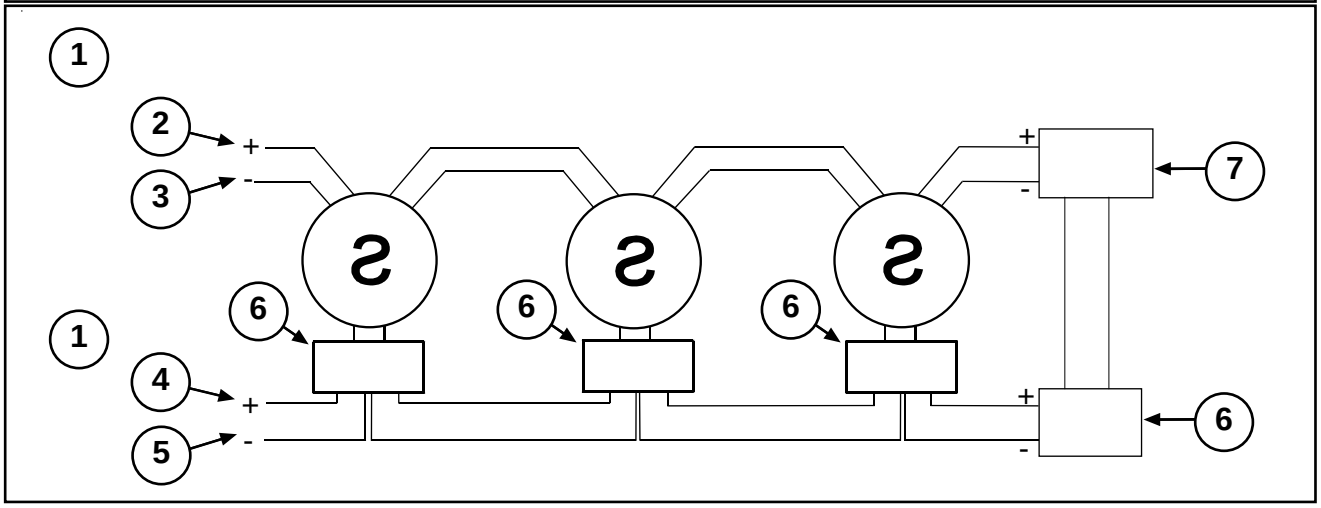
The D9124 System uses point programming to interpret the sensor loop information reported by the POPITs and make the appropriate system response.

Terminate all POPIT sensor loops with a 33 kΩ EOL resistor, Bosch Security Systems Model D106F, supplied with each POPIT Module. See *Figures 19* and *20*.

6.6.1 POPIT Displays

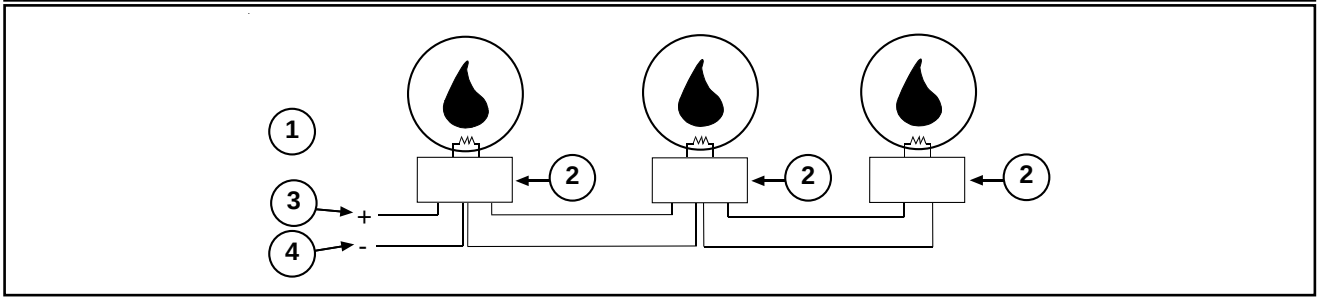
For a list of D1255, D1256, and D1257 displays, refer to the *User's Guide* provided with the command center or fire alarm annunciator.

Figure 19: Connecting Four-Wire Smoke Detectors



1 - Motherboard *3 - Common* *5 - Data loop negative* *7 - D294 EOL Supervision Relay*
2 - Switched + 24 VDC *4 - Data loop positive* *6 - POPIT*

Figure 20: Connecting Heat Detectors and Other Mechanical Devices



1 - Motherboard *2 - D9127P/U POPIT* *3 - Data loop positive* *4 - Data loop negative*

6.7 Central Station Reports

For a complete list of reports received by the D6600 receiver, refer to the *D6600 Computer Interface Manual*. Reports from the D9124 are the same as those generated by the D9412G.

The D9124 can transmit reports in either BFSK or Modem IIIa^2 formats. See *Phone* and *Phone Routing* of the *D9412G/D7412G Program Entry Guide* for important information about programming phone transmission formats and report routing.

If a POPIT disconnects from the D8125 POPEX Data Loop, a Trouble message appears immediately for points programmed for Trouble Reports. Refer to the *D9412G/D7412G Program Entry Guide* for programming options.

If you connect a POPIT programmed for a point number that does not appear in the program for the D9124 System to the D8125 POPEX Data Loop, it appears as an extra point at the command centers when the point is faulted, and during the Service Walk Test.

Placing a short on the D8125 POPEX Data Loop generates a PT Bus Trouble Report (in Modem IIIa^2 reporting format). The control panel sees all points on the shorted D8125 POPEX Data Loop as missing and responds according to point programming.

6.7.1 BFSK Reporting

The number transmitted when an event occurs on a point is programmed in P### BFSK Rpt Code, Point Assignments Module. This format sends summarized system information to the receiver.

6.7.2 Modem IIIa^2 Reporting

The actual point number is sent when the control panel is programmed to transmit reports using the Modem IIIa^2 format. You can program the D9124 System to send an additional flag with point reports. This flag tells the D6600 receiver to translate point and user numbers to a Bosch Security Systems D8112 style format. Using this feature depends on the type of automation system attached to the receiver. For details, see *Point/User Flag* in the *D9412G/D7412G Program Entry Guide, Phone Parameters* section.

7. Power Supplies

7.1 D9412GLTB, Command Center, and Modules

7.1.1 Primary Power

Primary (AC) Power Circuit

A 16.5 VAC/24 VAC dual secondary transformer (Bosch Security Systems Model D1601) is the primary power source. The AC power circuit provides 1.9 A of rectified AC power. The control panel reserves 500 mA of this power for internal operations, leaving 1.4 A for powered devices.

Transient suppressors and spark gaps protect the circuit from power surges. This protection relies on the ground connection at Terminal 10. Make sure Terminal 10 is connected to a proper ground. See *Section 3.4 Connecting the Earth Ground.*

AC Power Failure

The system indicates an AC power failure when the power at Terminals 1 and 2 is missing. The AC Fail Time program item sets the number of minutes AC must be missing before the control panel acknowledges the failure and the number of minutes after the power returns before the control panel acknowledges the restoral of power.

You can program AC Fail Time from 1 second to 90 minutes. The Bosch Security Systems default sets AC Fail Time at 82 seconds.

7.1.2 Secondary Power

Two 12 V, 7 Ah (up to 14 Ah) sealed lead-acid rechargeable batteries (D126) or two 12 V, 17.2 or 18 Ah (up to 34.4 or 36 Ah) sealed lead-acid rechargeable batteries (D1218) supply secondary power for the control panel, the command centers, auxiliary and alarm outputs, and powers the system during interruptions in primary (AC) power.

When connecting two D1218 Batteries to the control panel, both must have the same capacity (use two 17.2 Ah batteries or two 18 Ah batteries).

In applications where the supervision of two batteries is required, you must use a D113 Battery Supervision Module.

Only use lead-acid batteries. The charging circuit is calibrated for lead-acid batteries. Do not use gel-cell or nicad batteries.

Choosing the Right Batteries to Meet 12 V Requirements

To determine the correct battery size connecting to the system, you must know the amount of current the 12 V devices draw from the D9412GLTB. You also must know number of hours the batteries are expected to last. Refer to *12 VDC Device Calculations* in *Appendix A: Determining Battery Requirements* for worksheets of the actual calculations that must be performed to determine the current draw for your installation and the UL and NFPA standby battery requirements for your application.

Dual batteries are required for fire applications.

Table 12 contains examples of the impact of adding 12 V devices while meeting UL and NFPA requirements for fire detection systems.

Table 12 is for illustrative purposes only. You must perform actual calculations to determine the requirements for your installation and application.

Table 12: Examples of Standby Power Requirements (12 V Devices)

System Includes	Column B Total (mA)	Column C Total (mA)	Battery or Power Supply Requirements	
			24-Hour Standby	60-Hour Standby
D9124 only	562	874	One D1218	Additional power supply and batteries
D9124 + command center	668	1080	Two D1218s	Additional power supply and batteries
D9124 + command center + 119 POPITs	1025	1556	Two D1218s	Additional power supply and batteries
D9124 + D8125 + 238 POPITs + command center	1430	2080	Additional power supply and batteries	Additional power supply and batteries

Installing the 12 V Standby Source Batteries

When connecting two batteries, connect them in parallel. Before handling the batteries, see *Section 3.1 Safety* for important information.

1. Place the batteries on the bottom shelf. The longer set of leads from the battery harness connects to the battery on the right side of the battery shelf.
2. Connect the black negative wires from the battery harness to the negative terminals on the batteries.
3. Connect the red wires from the battery harness to the positive terminals on the batteries.

High-current arcs are possible. The positive (red) battery lead and Terminal 5 can create high-current arcs if shorted to other terminals or the enclosure. Use caution when working with the positive lead and Terminal 5. Always disconnect the positive (red) lead from the battery before removing it from Terminal 5.

Adding Additional Power Supply and Batteries

D8132 boosts battery backup. Adding a D8132 Battery Charger Module supports additional batteries of up to 36 Ah capacity, if required.

In applications where the supervision of two batteries is required, you must use a D113 Battery Supervision Module.

Use the D8132 Battery Charger Module to connect two additional batteries for a total of four. The control panel plus any connected D8132 Modules and AUX power supplies must be on the same AC circuit for discharging evenly if AC power fails. The number of D8132 Modules is determined by the number of available outlets on the same circuit. See *Table 15* for battery standby time calculations.

Replacing the Battery

Replace batteries every 3 to 5 years under normal use. Exceeding the maximum output ratings causes heavy discharges. Routine heavy discharges can lead to premature battery failure. Record the date of installation directly on the battery.

Battery Supervision

When battery voltage drops to 13.8 VDC, the yellow Charging Status LED lights. When the battery drops to 12.1 VDC, the red Low Battery LED lights and the control panel, if programmed for power supervision, transmits a Battery Low Report in the Radionics' Modem IIIa^2 Communication Format. It transmits a Trouble ZN 9 Report in the BFSK format.

If the battery is missing or shorted, the red Low Battery LED flashes at the same rate as the green Operation Monitor LED. If the control panel is programmed for power supervision, it transmits a Battery Missing Report in the Modem IIIa^2 format, or Trouble ZN 9 Report in the BFSK format.

When battery voltage returns to 13.7 VDC, the Low Battery LED goes out. If the control panel is programmed for power supervision, it transmits a Battery Restoral Report in the Radionics' Modem IIIa^2 Communication Format or Restoral ZN 9 Report in the BFSK format. At 13.9 VDC, the Charging Status LED goes out.

Investigate low battery reports immediately. If primary (AC) power is off and the discharge continues, the control panel becomes inoperative when the battery voltage drops below 10.2 VDC.

Battery Charging Circuit

The float voltage for the battery charging circuit is 13.5 VDC to 13.9 VDC at a maximum current of 1.4 A. If float voltage drops below 13.5 VDC, the Charger LED illuminates.

Loss of AC Load Shed Relay protects batteries. During an AC power loss, the batteries supply all power to the D9124 control panel. If the battery voltage falls below 10.2 V during an AC power loss, a load shed relay isolates the battery from the control panel and disables the control panel. Load shed protects the battery from being damaged by deep discharge. When AC power restores, the load shed relay resets and battery voltage is again available.

Overcharge load shed with AC present. If more than 1.4 A of current draw from the control panel is detected, the control panel shuts down. Remove all loads to the control panel and disconnect AC power. Add a new battery and reconnect AC power.

Reset the control panel by momentarily placing the Reset pin in the disable position (*Figure 8*). The red Low Battery LED continues flashing until you reset the control panel.

A shorted battery condition is created by a shorted cell inside the battery or by a short on Terminals 4 and 5. A shorted battery may generate Watchdog Reset Reports.

See *Table13* for the battery discharging and recharging cycles. *Table 14* identifies and defines the Charging Status and Low Battery LEDs.

Table 13: Battery Discharge and Recharge Cycles

Discharge Cycle		Recharge Cycle	
Float Voltage (VDC)	**Indication**	**Float Voltage (VDC)**	**Indication**
13.9	• Battery is fully charged. • Charging Status LED is off.	AC is on.	• Load Shed relay resets. • Battery charging begins. • Battery Trouble and AC Restoral Reports sent.
13.8	• Charging Status LED is on.	13.7	• Battery Restoral Report sent. • Low Battery LED is off.
12.1	• Battery Trouble and AC Fail Reports, if programmed. • Low Battery LED is on.	13.9	• Charging Status LED is off. • Battery is fully charged.
10.2	• Battery Load Shed (processing continues if AC present.)		

Table 14: Charging Status and Low Battery LEDs

Type	LED Color	LED State	Indicates
Charging Status LED	Yellow		Shows the charging status of the battery.
	Yellow	Off	Battery is fully charged.
			If the battery is missing, shorted, or reversed, the Charging Status LED is off. The red Low Battery LED is flashing.
	Yellow	On	Battery float charge is below 13.8 VDC. If AC is present, the battery is charging.
			Combined current draw from all outputs exceeds 1.4 A (normal under alarm conditions for non-fire systems when sirens of bells draw more than 1.4 A).
			If the LED illuminates regularly for extended periods or does not go out, check the current draw for devices connected to the power outputs. See *Section 8.0 Power Outputs* for instructions.
Low Battery LED	Red		Shows the battery condition.
	Red	Off	Battery is fully charged.
	Red	On	Battery voltage is below 12.1 VDC. LED goes off when voltage reaches 13.7 VDC.
	Red	Flashes (same rate as Green LED)	Battery is missing or shorted. (Green LED is the Operation Monitor LED.)

7.2 24 VDC Initiating and Indicating Devices

7.2.1 Primary Power

The D1601 is a 120 VAC, 16.5 V/24 VAC dual secondary transformer, which is the primary power supply for the control panel and initiating devices of the D9124. See *Section 3.5 Installing the D1601 Transformer* for more information about installing the D1601.

7.2.2 Secondary Power

Secondary power for the alarm indicating devices (such as bells, horns, and strobes) is supplied by two D126 12 V, 7 Ah sealed lead-acid rechargeable batteries or up to two external D1218 12 V, 17.2 or 18 Ah sealed lead-acid rechargeable batteries (or larger) in a separate enclosure.

When connecting two D1218 Batteries to the control panel, both must have the same capacity (use two 17.2 Ah batteries or two 18 Ah batteries).

Replace batteries every 3 to 5 years under normal use. Use only lead acid batteries.

Choosing the Right Batteries to Meet 24 V Requirements

The correct size of batteries connected to the system depends on the amount of current the devices draw from the power supply and the standard you are meeting. *Table 15* contains examples of the amount of current the 24 VDC devices can draw, depending on the battery Ampere-hours you installed and the amount of standby time you need. The calculations for *Table 15* include current requirements for 5 minutes of bell time at the end of the standby period.

For example, if you have 7 Ah of battery capacity (two D126 batteries installed) and you need to provide 24 hours of standby time, the 24 VDC devices may draw no more than 0.135 A. In addition to the 0.135 A of continuous current drawn, you can also attach up to 3 A of indicating devices (bells for up to 5 minutes) to the Bell Circuit terminals on the motherboard.

The maximum standby current cannot exceed 1.5 A, the maximum bell current cannot exceed 3 A, and the total current cannot exceed 4 A. See *Section A.1.2 24 VDC Device Calculations* for more information.

Installing the 24 V Standby Source Batteries

See *Section 3.3 Safety* before installing batteries.

1. Place the batteries on the top battery shelf.
2. Connect the black negative wires from battery harness P7 to the negative terminals on the batteries.
3. Connect the red wires from battery harness P7 to the positive terminals on the batteries.
4. Plug battery harness P7 into Connector J7 on the D9142 power supply.

D9142 24 VDC Power Supervision

The float charge voltage for the battery charging circuit is 27.6 VDC. When the float charge drops to a low battery condition, or when the batteries are removed, the red LED on the power supply illuminates. The D9142 sends a Tbl Point 8 Report to the receiver, Point 8 displays a trouble at the command center. Investigate low battery reports immediately.

Circuit Protection

The power supply limits current output to 4 A. It is protected against reversed battery polarity, thermal overload, and current overload with a self-resetting current limited circuit.

Table 15: Examples of Standby Power Requirements (24 V Devices)

	24-Hour Standby		60-Hour Standby		72-Hour Standby	
Battery Amp-Hours	Current (A)	Recharge Time (Hrs.)	Current (A)	Recharge Time (Hrs.)	Current (A)	Recharge Time (Hrs.)
7	0.136	10	0.030	12	0.012	12
12	0.322	10	0.105	12	0.075	12
14	0.397	11	0.135	12	0.100	12
17.2	0.517	13	0.183	14	0.140	14
24	0.771	18	0.286	18	0.225	18
36	1.219	34	0.467	27	0.376	26
38	1.294	37	0.497	29	0.401	28

8. Power Outputs

8.1 Auxiliary

All external connections at the D9124 motherboard are power limited.

8.1.1 12 V Auxiliary Power from D9412GLTB Terminal 1

The D9124 supplies 1.4 A at 10.2 VDC to 14 VDC to power auxiliary devices. A self-resetting circuit breaker protects the circuit against shorts. Devices powered from this output must operate within a range of 10.2 VDC to 14 VDC.

8.1.2 24 VDC Power from Motherboard Terminal 5

Use Terminal 5 to power smoke detectors or other devices reset by interrupting power. Performing a detector reset from the command center momentarily interrupts 24 VDC power to Terminal 5 to reset the smoke detectors.

Power Output Depends on Standby Time Requirements

If your standby requirements call for 24-hour standby time, the D9142 power supply provides up to 0.136 A at Terminal 5 on the motherboard with 3 A of bell current available for 5 minutes of alarm after a 24-hour period of AC power loss. To increase this output, use larger capacity batteries (up to 38 Ah) in an additional enclosure (see *Table 15*).

If your application requires 60 hours of standby time, the D9142 provides 0.030 A of standby current at Terminal 5 on the motherboard. Also, 3 A of bell current is available for 5 minutes of alarm after a 60-hour period of AC power loss. To increase this output, use larger capacity batteries (up to 38 Ah) in an additional enclosure (see *Table 15*).

See *Section A.1.2 24 VDC Device Calculations* for more information about standby time and available power output.

Total output power for the D9124 must not exceed 4 A. The total output power for auxiliary power (Terminal 5), and the 24 VDC indicating circuits (Terminals 7 and 9) must not exceed 4 A. Exceeding 4 A overloads the D9142 power supply. See *A.1.2 24 VDC Device Calculations* for more information.

Verification/Sensor Reset Relay

Relay B is Terminal 7 on the D9412GLTB board. Terminal 7 on the D9412GLTB controls the output at Terminal 5 on the D9124 motherboard. When Relay B is energized for detector reset or alarm verification, power to Terminal 5 of the D9124 is interrupted.

See *Area Parameters A# Verify Time, Point Indexes*, and *Relay Parameters A# Reset Sensors* in the *D9412G/D7412G Program Entry Guide* for instructions on programming verification/reset relays and points.

Pressing [DETECTOR RESET] activates verification/reset relays for 5 seconds. The control panel ignores the verification/reset points while the relay activates.

8.2 Alarm Power Output for Indicating Circuits

8.2.1 24 VDC Output Terminals 7 and 9

Each Alarm Power Output Terminal (7 and 9) on the motherboard provides 24 VDC, 1.8 A maximum of alarm power output for bells, sirens, piezo fire sounders, and electronic horns and strobes. Current calculations in *Table 15* are based on a 3 A maximum.

Total output power for the D9124 must not exceed 4 A. The total output power for auxiliary power (Terminal 5), and the 24 VDC indicating circuits (Terminals 7 and 9) must not exceed 4 A. Exceeding 4 A overloads the D9142 power supply. See *A.1.2 24 VDC Device Calculations* for more information.

8.2.2 Alarm Power Output Responses

Programming in the Bell Parameters, Point Index Codes, Point Assignments, and Relay Parameters determines the responses of Terminals 7 and 9. See the *D9412G/D7412G Program Entry Guide* for programming instructions.

Relay A is Terminal 6 on the D9412GLTB. Terminal 6 on the D9412GLTB controls the output at Terminals 7 and 9 on the D9124 motherboard. Energizing Relay A provides power to Terminals 7 and 9 on the motherboard. The default program sets Relay A for A# Fire Bell. There is no need to reprogram the relay.

Notes:

9. Telephone Connections

9.1 Registration

The Bosch Security Systems D9124 Control Panel is registered with the FCC under part 68, for connection to the public telephone system using an RJ31X or RJ38X jack installed by the local phone company.

An RJ31X jack can be modified to become an RJ38X jack by placing a jumper wire between Terminals 2 and 7.

9.2 Notification

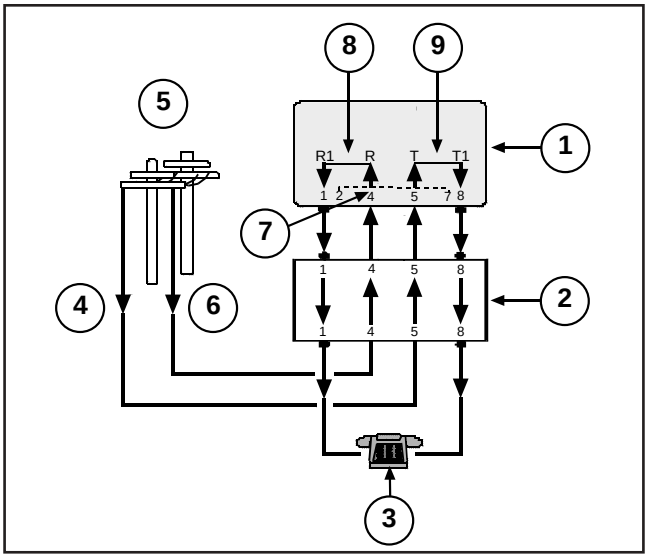
Do not connect registered equipment to party lines or coin-operated telephones. Notify the local telephone company and supply them with the following information before connecting the control panel to the telephone network:

- The particular line to which the control panel will be connected
- The make (Bosch Security Systems), model (D9124), and serial number of the control panel
- FCC registration number and ringer equivalence for the control panel. Refer to *Part 68* in *Section 1.4 FCC Rules* or to the label on the D9124 for this information

9.3 Location

To prevent signal jamming, wire the RJ31X or RJ38X jack before the in-house phone system to support line seizure (*Figure 21*). Install the jack on the street side of the phone switch, wired ahead of any PBX equipment. Line seizure provides for a temporary interruption of normal phone usage while the control panel transmits data. After installation, confirm the control panel seizes the line, acquires dial tone, reports correctly to the receiver, and releases the phone line to the in-house phone system.

Figure 21: D166 (RJ31X Jack) Wiring



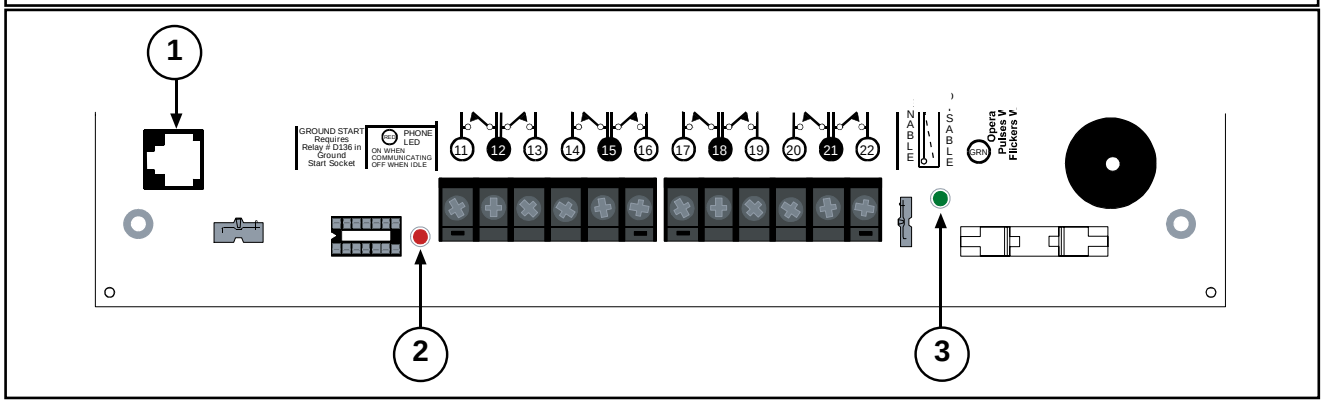
1 - RJ31X or RJ38X jack
2 - Telco connector block
3 - Premises telephone
4 - TIP
5 - Outside Telco
6 - RING
7 - Strap across Terminals 2 and 7 creates RF38X
8 - RING (red)
9 - TIP (green)

9.4 Phone Cord Connection

Connect one end of a D161 (2.1 m [7 ft.]) or a D162 (61 cm [2 ft.]) telephone cord to the Telco cord connector located on the bottom left corner of the control panel (*Figure 22*). Then, connect the other end to the RJ31X or RJ38X jack.

To supervise the phone cord, use an RJ38X jack.

Figure 22: Telephone Connector and LED and Operation Monitor LED Connections



1 - Telephone cord connector
2 - Telephone LED (red)
3 - Operation monitor LED (green)

9.5 Phone LED (Red)

The red Phone LED lights when the control panel seizes the phone line, and remains lit until the control panel returns the phone line. See *Figure 22* for the location of the red LED.

9.6 Operation Monitor LED (Green)

The green Operation Monitor LED indicates the central processing unit (CPU) is working. When the CPU is operating normally, the LED flashes 0.5 second on, 0.5 second off.

The green LED also serves as a ring indicator. The LED is located on the lower right side (see *Figure 22*). When there is ring voltage on the phone line (the phone is ringing), the green LED flickers at a faster rate for the duration of each ring. Ring voltage must reach a minimum of 45 VAC before the system detects it.

9.7 Dialing Format

You can program the system to use DTMF or pulse dialing. See *Phone Parameters* in the *D9412G/D7412G Program Entry Guide*.

9.8 Phone Line Monitor

The control panel has a built-in phone line monitor that tests the phone line for voltage. If the D928 Dual Phone Line Switcher is used to connect two phone lines to the control panel, the control panel monitors both lines. The normal voltage on a telephone line is approximately 48 VDC (24 VDC for some phone systems). The phone line monitor senses trouble when the voltage on the line falls below 3.0 VDC.

If the monitor senses trouble, it starts a programmable phone line trouble timer, which continues to run as long as the monitor senses trouble. It resets to zero when the control panel senses a normal line. If the timer reaches the delay time in the Phone Supervision program item, it begins a phone line trouble response. Programming determines what the response is. See *Phone Parameters* in the *D9412G/D7412G Program Entry Guide*.

Any time the D9412G/D7412G uses the phone line to make a call or is on-line with RPS, it ceases to monitor the phone line during this process. Once the phone line on the D9412G/D7412G is no longer in use, it begins once again to monitor the phone line.

Bad line may test OK. The telephone line monitor uses voltage levels to test the phone line status. In some instances, a given telephone line can be out of service without affecting the voltage on the line. The phone line monitor can not recognize this trouble condition.

9.9 Called Party Disconnect

Telephone companies provide “called party disconnect” to allow the called party to terminate a call. The called party must go on hook (hang up) for a fixed interval before a dial tone is available for a new call. This interval varies with telephone company equipment. D9124 firmware allows for “called party disconnect” by adding a 35-second “on hook” interval to the dial tone detect function. If the control panel does not detect a dial tone in 7 seconds, it puts the phone line on hook for 35 seconds to activate “called party disconnect,” goes off hook and begins a seven-second dial tone detect. If no dial tone is detected, the panel dials the number anyway. Each time the number is dialed, the control panel records this as an attempt.

9.10 Communication Failure

After ten attempts to reach the receiver, the control panel goes into communication failure. The control panel clears any reports in its phone buffer and a COMM FAIL RTE # event is generated, which appears in the display at command centers. A trouble sounder can be programmed to annunciate at the command centers.

One hour after the COMM FAIL RTE # is generated, the control panel attempts to send this event, if programmed. If the COMM FAIL RTE # event is the only event in the queue and cannot reach the central station, the command centers do not turn on the trouble sounder again.

If the D928 Dual Phone Line Switcher is used, the D9124 makes a total of ten attempts before going into communication failure.

9.10.1 Enhanced Communication

The D9124 Control Panel transmits events over the SDI bus to a D9133TTL-E Network Interface Module. For more information on enhanced communications capabilities, refer to *RADXAUX1* in the *D9412G/D7412G Program Entry Guide*.

9.11 Ground Start

Some telephone systems require a momentary ground input to initiate dial tone. To interface with a ground start system, insert a D136 plug-in relay into the GND START socket and set the Phone Monitor Select jumper to the GND START position.

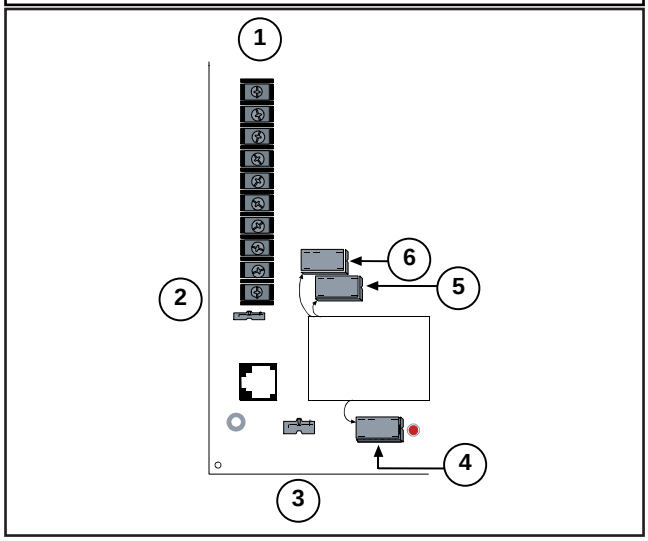
Do not use ground start in NFPA applications. You cannot use ground start telephone systems for NFPA central station protective signaling or remote station applications.

Connect Terminal 10 to an earth ground so the ground start phone systems operate properly on the D9124.

9.11.1 Relay Installation

Power down the system before inserting the D136 relay into the GND START socket. The relay socket is in the lower left corner as shown in *Figure 23*. The plug-in relay is shorter than the socket it plugs into. It can be installed in either the left or right end of the socket.

Figure 23: Terminals 7 and 8 Relays and Ground Start



1 - Top
2 - Left
3 - Bottom
4 - Gnd Start
5 - SW Aux
6 - ALT alarm

Note: The D136 relays are inserted with the three pins towards the top side.

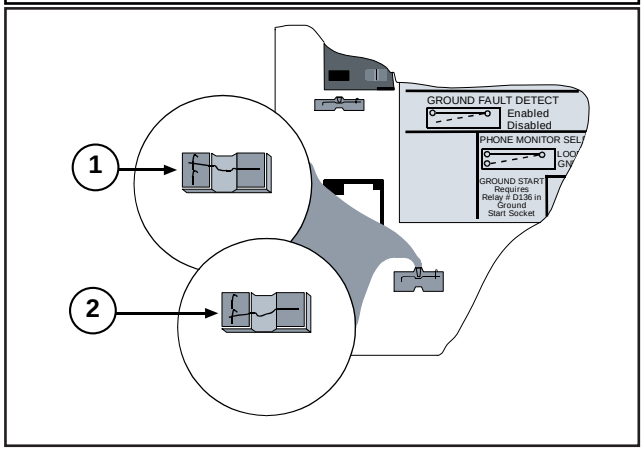
Do not rely on relay labelling. Do not rely on the labelling to install D136 relays. Check for the side with three pins. The three pins go on the top side of the socket.

Incorrect insertion does not damage the relay or the control panel, not the related circuits do not function properly. Do not insert a ground start relay if the ground start jumper is in the loop start position (see *Figure 24*).

9.11.2 Phone Monitor Select Jumper

The Phone Monitor Select jumper is above the Telco connector point at the lower left corner of the control panel. Set it in the ground start position (*Figure 24*).

Figure 24: Phone Monitor Select



1 - Loop start position 2 - Ground start position

9.12 D928 Dual Phone Line Switcher

9.12.1 Description

The optional D928 Dual Phone Line Switcher lets the control panel transmit reports over two separate phone lines. The control panel monitors both lines. If a signal is generated and the control panel senses a line is bad, it attempts to use the other phone line to send the message. If trouble is detected, the control panel keeps the faulty phone line in memory.

Set the ring count above 2 on answering machines. The control panel RPS line monitor feature may not operate correctly if an answering machine with a ring count of less than two is connected to a phone line used by the D928 Module.

Two phone lines are required in UL Listed fire applications.

9.12.2 Operation

See *Phone* in the *D9412G/D7412G Program Entry Guide* for phone supervision and reporting options. Set the Two Phone Lines prompt to **YES** to use the D928.

When the D928 is installed, the control panel alternates between Phone Line 1 and Phone Line 2 to send its first report. For example, on day one the control panel attempts to first communicate on Phone Line 1. On day two, the panel switches and attempts to communicate on Phone Line 2.

Any time the control panel resets or powers down/up, the next reported event always attempts to call out on Phone Line 1 first.

If Phone Line 2 is not in service on Day 2, the control panel switches to the primary phone line to send the report.

With the D928 Dual Phone Line Switcher installed, the control panel uses two phone lines (primary and secondary) to dial up to four phone numbers.

When using a primary and backup device within a Route Group #, the control panel makes two attempts on the primary phone line using the Primary Device # as programmed. If these two attempts fail, the control panel switches to the secondary phone line using the Backup Device # as programmed. This pattern continues for a total of ten attempts. After ten unsuccessful attempts, the control panel generates a Comm Fail event for the given Route Group #.

9.12.3 Watchdog Feature

The D928 watchdog circuit monitors the control panel's CPU for proper operation. If the CPU fails, the buzzer on the D928 sounds, as does the sounder on the control panel. This sounder cannot be reset when the CPU fails. The D928 stops sounding only when the control panel CPU returns to normal operation.

9.12.4 Installing the D928

Mounting

Mount the D928 on the lower right side of the enclosure using the screws provided with the switcher.

Wiring

The D928 has two flying leads. The green lead monitors AC power. The black lead provides surge protection for the two incoming phone lines. The black lead is also the ground reference for the AC LED.

1. Connect the green lead from D928 to Terminal 1.
2. Connect the black lead from D928 to Terminal 9.

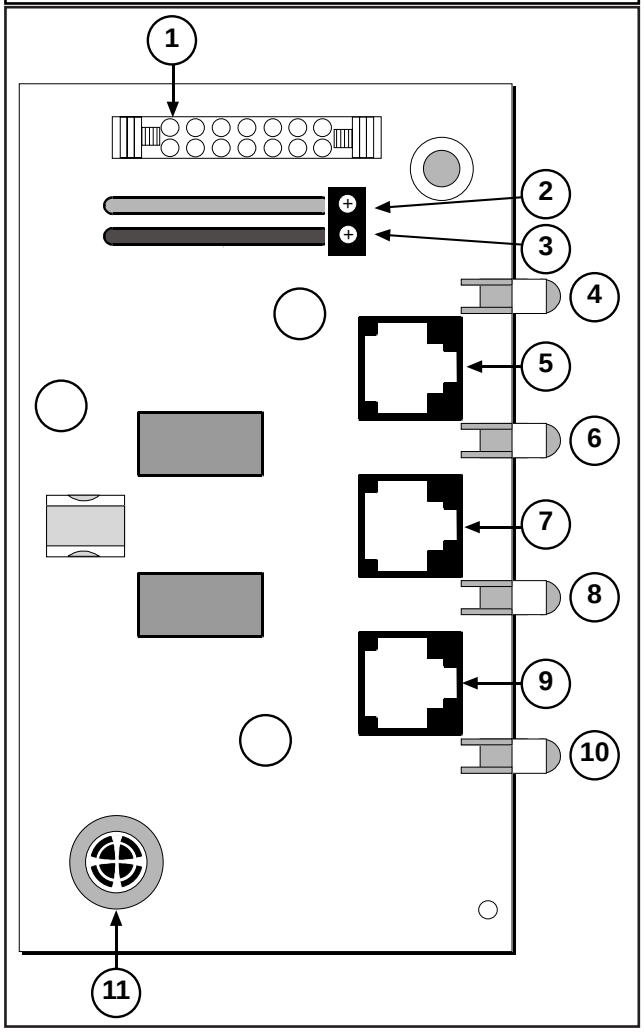
Phone Connections

1. Plug one end of the ribbon cable (provided with the D928) into J4 on the D928. Plug the other end into the accessory connector on the control panel.
2. Plug one end of the D162 (61 cm [2 ft.]) phone cord, provided with the D928, into J3 on the D928. Plug the other end into Telco on the control panel.
3. Plug one end of a D161 (2.1 m [7 ft.]) or D162 (61 m [2 ft.]) phone cord into J1 on the D928. Plug the other end into the RJ31X or RJ38X for the primary phone line.
4. Plug one end of a D161 or D162 phone cord into J2 on the D928. Plug the other end into the RJ31X or RJ38X for the secondary phone line.

9.12.5 D928 Status LEDs

Four LEDs, mounted on the front edge of the D928 Module, show the status of AC power for the control panel, status of the two phones lines, and communication failure (*Figure 25*). When programmed and operating normally, only the green AC power status LED is lit.

Figure 25: D928 Dual Phone Line Switcher



1 - Connect to ACCESSORY CONNECTOR with ribbon cable.
2 - Green to Terminal 1
3 - Black to Terminal 9
4 - AC Power LED (green)
5 - Phone jack to primary phone line - RJ31X
6 - Primary Fail LED (yellow)
7 - Phone jack to secondary phone line
8 - Secondary Fail LED (yellow)
9 - Phone jack to TELCO Connector
10 - Communications Fail LED (yellow)
11 - Buzzer

AC Power LED

The green AC Power Status LED lights when there is AC power at Terminals 1 and 2 on the control panel.

10. Programming

1. If you have not created a control panel program, review the *D9412G/D7412G Program Entry Guide* and copy the control panel or use the default record to avoid erasing the default program for the D9124.
2. Make sure you have all the required accessory modules installed for the features you want to use.
3. Load the D5500 RPS onto a PC and create a program for your D9124 System. Refer to the *RPS Operations Manual* for complete information on using the D5500 RPS.
4. Record your program choices on the *D9124 Program Record Sheet* and fill in the Point Chart Label.

10.1 Programmer Connector (J7)

10.1.1 Using a D5360

To connect and disconnect a local PC for programming the control panel using the D5500 RPS:

1. Connect the D5360 to your PC serial port. The D5360 has a DB-9 female serial connector. If this does not fit your PC, you need an adapter.
2. Connect the supplied connector cord (modular to Molex) from the D5360 to the programmer connector port (J7) on the control panel.
3. Lock the Reset Pin (*Figure 8*).

SDI Troubles are reported after 30 seconds if the Reset Pin is not locked and the D5200 Programmer remains connected.

4. Perform the desired programming function (send or receive program).

If you send a program to the control panel, the control panel sends a Prog Access OK Report 10 seconds after you exit the handler or when you disconnect the programmer. Program the Diagnostic Reports prompt in Routing **YES** to send this report.

5. Disconnect the programmer.
6. Unlock the Reset Pin to accept the programming changes and reset the control panel. Note that the control panel on-board buzzer sounds for 1 second whenever the control panel resets.

10.2 Programmable Test Features

See *Section 11.0 Testing the System* for information on operating these test features.

10.2.1 Fire Test

The Fire Test lets one person perform a Fire Test without assistance. This test:

- Reports to the receiver when you start/end the test.
- Annunciates local sounders without sending reports to the receiver.
- Automatically resets smoke detectors. You need not press [SENSOR RESET] to reset sensors after testing each device.
- Prints a record of each alarm test response when a local printer is installed.

Fire Test suppresses alarms and troubles. All alarm and trouble reports to the receiver are suppressed when Fire Test is in progress.

Make sure the Sensor Reset is enabled when you are using the Fire Test. Fire Test is described in *Section 11.0 Testing the System* and in the *User's Guide* provided with the D1255 and D1255R Command Centers.

10.2.2 Walk Test

The Walk Test tests points that turn on and off as part of an intrusion system. This test is performed in the same manner as the Fire Test.

10.2.3 Service Walk Test

The Service Walk Test tests all points and is performed in the same manner as the Fire Test.

10.2.4 Automatic Test Reports

The D9124 can generate automatic Test Reports, which are used to test the phone lines. NFPA 72 Central Station and remote station standards require you to send a Test Report at least once every 24 hours.

Refer to *Section 2.2.6 Skeds* for programming Test Report schedules. See *S## Function Code Selection Number 9–Test Report* in the *D9412G/D7412G Program Entry Guide* for programming requirements. You can defer the test report if the control panel generates a report other than the Automatic Test Report. Use the additional parameter S## DEFER TEST to postpone the test until the next scheduled test report.

Program the Test Report to send additional system event information. See *Expand Test Rpt* in the Phone section of the *D9412G/D7412G Program Entry Guide* for more information.

See *Section 9.12 D928 Dual Phone Line Switcher* for details on phone line failure reports.

When setting test times, a D1255 or D1255R Command Center is required to set the control panel clock and calendar. See the *C-Time/Date* section of the *Security System User's Guide* supplied with the command center for operating instructions.

11. Testing the System

11.1 Fire Test

Test fire points to confirm they function properly. You can review untested points at the command center to help pinpoint any problems.

Upon initiation, the Fire Test tests the fire alarm output and activates the command center fire sounder for 2 seconds. The AC disables for 4 minutes to test the system's battery power. If the battery cannot maintain the system for the 4-minute period, the command center appears to go dead. At the end of the 4-minute period, AC returns to the system and the control panel restores. A message is sent to the receiver upon initiation and completion of the Fire Test.

During the Fire Test, no alarms are sent to the central station.

If there is no activity on the system for 20 minutes, the system automatically exits from the Fire Test and sends a restoral message to the receiver.

11.1.1 Using Fire Test

1. Press [ESC] on the D1256 Command Center to enter the menu.
2. Press [NEXT] repeatedly until you reach the `FIRE TEST ?` prompt and then press [ENT].

   The display shows `### PTS TO TEST`.
3. Activate the detection devices one at a time to fault each point.

   As you activate each point, your command center shows the point text for 60 seconds and rings the fire sounders for 2 seconds. This verifies the detection device is working properly. The D9124 System automatically resets smoke detectors.

   When a resettable point (such as a smoke detector) is faulted, the display shows `SENSOR RESETTING` for 5 seconds. During this time power is removed from smoke power relays.

   Activating a point more than once does not increment the test count. The command center emits a brief tone and displays the point text each time you fault the point allowing you to test multiple devices assigned to one point.
4. When all 24-hour points are tested, `0 PTS TO TEST` appears. Press [ESC]. The display momentarily shows `ALL PTS TESTED` before returning to idle text.
5. During the Fire Test you can see the points that remain untested. When point text appears, press [ESC].
6. When the display shows `### PTS TO TEST` press [ESC].
7. `VIEW UNTESTED ?` appears. Press [ENT].
8. The display shows `### PTS UNTESTED`. Press [NEXT] to see a list of the points that are not yet tested. Continue pressing [NEXT] to scroll through the list.
9. Press [ESC] to resume the Fire Test. `### PTS UNTESTED` appears.
10. Press [ESC]. The display shows ### PTS TO TEST and you can resume testing points.
11. Press [ESC] twice to end the Fire Test.

Automatic time-out returns the system to idle text. If there is no point or command center activity for 20 minutes, the Fire Test ends automatically and the D9124 System sends a restoral message to the receiver. The command center returns to idle text.

11.2 Service Walk Test

The Service Walk Test differs from the standard Walk Test. POPITs whose addresses are set for a point number not programmed in the control panel appear in the Service Walk Test.

The Service Walk Test is only available at command centers with a panel-wide scope. Refer to the *Command Center* sections in the *D9412G/D7412G Program Entry Guide* for a description of command center scope.

Fire and other 24-hour points do not transmit reports to the receiver during the Service Walk Test.

To perform a Service Walk Test:

1. Choose a command center with panel-wide scope to conduct the test. Be certain the display shows the idle disarmed text.
2. Press [MENU] to enter the Function List, or press [9] [9] [ENT] to show the first item in the Service Menu.
3. Press [NEXT] to step through the menu items until `SERVICE WALK?` appears in the display.
4. Press [ENT]. If you programmed Service Walk Test access to be restricted by authority level, `ENTER PASSCODE` appears in the display.

5. Enter a passcode assigned an authority level with access to the Service Walk Test function. Then press [ENT].
6. When `246 PTS TO TEST` appears, test the first detection device.

   As you fault the detection devices, the command center emits a short tone, briefly displays the point text for the point tested, and returns to the points to test display.

Extra Points display default text. If you incorrectly set the addresses on a POPIT to a point number that is not in your control panel program, the default text for that point number (`POINT ###`) displays when you fault the point. The *D9124 Program Record Sheet* shows the default text for all points.

   Faulting the point a second time produces the tone and displays the point text, but does not reduce the Pts to Test count.

7. During the Service Walk Test, view the points that remain untested by pressing [ESC] when point text appears.
8. When the display shows `### PTS TO TEST`, press [ESC].
9. `VIEW UNTESTED ?` appears. Press [ENT].
10. When `### PTS UNTESTED` appears, press [NEXT] to see a list of the points that were not yet tested. Continue pressing [NEXT] to scroll through this list.
11. To resume the Service Walk Test, press [ESC].
12. When the display shows `### PTS UNTESTED`, press [ESC].
13. `### PTS TO TEST` appears and you can resume testing points.
14. Press [ESC] twice to end the Service Walk Test. After testing the last point, the display shows `0 PTS TO TEST`. Press[ESC]. The display momentarily shows `ALL PTS TESTED` before returning to idle text.

Automatic time-out returns the system to idle text. If there is no point or command center activity for 20 minutes, the Walk Test ends automatically and the D9124 System sends a restoral message to the receiver. The command center returns to idle text.

12. Troubleshooting

12.1 Introduction

Use this guide to help troubleshoot problems with the D9124 Control Panel. To prevent problems from occurring, read the preceding sections and the *D9412G/ D7412G Program Entry Guide* to verify the control panel is correctly installed and programmed.

12.2 Self-Diagnostic Tests

D9124 Control Panel performs a series of self-diagnostic tests of hardware, software, and programming at start up and reset.

Buzzer sounding is normal at start-up: The on-board buzzer, located on the lower right corner of the control panel, sounds as the D9124 performs self-diagnostic tests at start up and reset. These tests take less than 2 seconds. If all tests complete successfully, the buzzer turns off. The control panel continues periodic internal testing during normal operation. If a fault is detected during testing, the buzzer sounds.

Table 16 identifies system problems that display during self-diagnostic tests and describes how to troubleshoot them.

Table 16: Self-Diagnostic Tests

Problem	Diagnosis	Solution
`CALL FOR SERVICE` appears in the command center display. No buzzer sounds at the command center.	A command center stopped receiving data from the control panel.	Check the wiring for opens, grounds, or shorts.
`COMM FAIL ROUTE #` appears in command center displays.	The control panel made ten unsuccessful attempts to report to the receiver.	• See *Section 12.6 Communication Failure*. • Press [ESC] to silences the buzzer. The display clears when communication restores (such as the receiver acknowledging a report).
`PANEL BROKEN` appears in the displays of all command centers, the command center buzzer sounds, and the green Operation Monitor LED stops flashing or is off.	A hardware or software problem occurred.	Pressing [ESC] does not silence the buzzer. Return the control panel to Bosch Security Systems for repair. See *Section 3. Installation* for information on installing a working control panel.
`PARAM FAIL` alternates with the idle text at the command centers, the command center buzzer sounds, the green Operation Monitor LED continues flashing, and the control panel sends a Bad Param Cksum Report to the receiver.	The program is corrupted.	Pressing [ESC] might silence the buzzer. Silencing the buzzer does not correct the problem. The corrupted copy of the program in the control panel must be replaced. Load a new copy of the complete program. The displays clear when the control panel is reset after loading a new program. See *Section 10. Programming*.
`SERVC AC FAIL` appears in the command center displays.	AC power was interrupted at Terminals 1 and 2.	Press [ESC] to silence the buzzer. Restoring power clears the display. ***Note: Program the control panel to send an AC Fail Report to the receiver.***
`SERVC BATT LOW` appears in the command center displays.	Battery voltage at Terminals 4 and 5 fell below 12.1 VDC.	• See *Section 12.11 Battery and Power Reports* for probable causes and remedies. • Press [ESC] to silence the buzzer. The display clears when battery voltage reaches 13.7 VDC.
`SERVC BATT MSING` appears in the command center displays.	The control panel cannot detect a battery at Terminals 4 and 5.	Press [ESC] to silence the buzzer. Restoring the battery clears the display. ***Note: Program the control panel can to send a Battery Missing Report to the receiver.***

Table 16: continued

Problem	Diagnosis	Solution
SERVC GND FAULT appears in command center displays.	The control panel detected an earth ground fault.	Follow the steps in *Section 12.16.1 Isolating Ground Faults.* See also Connecting Earth Ground in the *D9412G/D7412G Operation and Installation Guide*.
SERVC KEY PAD appears at other command centers connected to the control panel, and the control panel transmits an SDI Failure Report to the receiver.	The control panel lost contact with a supervised command center.	Press [ESC] to silence the buzzer. The displays clear when contact with the missing command center restores.
SERVC 9210 #n appears at the other command centers connected to the control panel and the control panel transmits an SDI Failure ## Report to the receiver.	The control panel lost contact with a D9210B Access Interface Module.	Check the wiring for opens, grounds, or shorts.
SERVC PH LINE #1 (SERVC PH LINE #2) appears in command center displays.	The control panel detected a phone line fault.	See *Section 12.5 Phone Line*. Also, refer to Phone Line Monitor in the *Telephone Connections* section in the *D9412G/D7412G Operation and Installation Guide* for a complete description.
SERVC PRINTER appears in command center displays.	The control panel lost contact with a supervised printer.	Press [ESC] to silence the buzzer. The displays clear when contact with the missing printer restores.

12.3 Control Panel Programming

Become familiar with the basic operation of the D5200 programmer before attempting to program the control panel (see the *D5200 Operation Manual*).

Table 17 identifies problems that can occur at the control panel and describes how to troubleshoot them.

Table 17: Control Panel Programming

Problem	Diagnosis	Solution
The programmer displays PLUG IN PANEL when you press [SEND] or [RECEIVE].	The programmer is not correctly connected to the control panel.	• Verify the data/power cord is plugged into the communicator port on the D5200. • Verify the data/power cord is plugged securely into the control panel programmer connector. • Check each conductor in the data/power cord for continuity.
	AC induction through the on-board point sensor loops, the DATA bus, or the ZONEX bus.	• Verify a proper earth ground at Terminal 10. • Disconnect on-board point sensor loops, data bus (Terminals 30 and 31), and ZONEX bus (Terminals 25 to 28).
After plugging in the programmer, the control panel transmits SDI Trouble Reports for supervised SDI devices (such as command centers and printer interface modules). All SDI devices stop operating.	The control panel handler was not entered within 30 seconds of plugging in the programmer.	• Enter the control panel handler within 30 seconds of plugging in the programmer. • Once the SDI reports are generated, sending or receiving a handler or disconnecting the programmer returns the SDI devices to normal operation.

12.4 Command Centers

Table 18 identifies problems that can occur at command centers and describes how to troubleshoot them.

Table 18: Command Centers

Problem	Diagnosis	Solution
Command centers show erratic behavior. For example, the pip that confirms you pressed a key echoes.	• More than one command center has the same supervised address. • Data connections (yellow and green wires) on one or more command centers are reversed, or only one wire is connected.	• Use a supervised address in one command center only or use a different supervised address for each command center. • Verify the yellow and green data wires are correctly connected on all command centers.
`NO AUTHORITY` displays at the command center when you enter your passcode to perform a function.		• Check the User Interface section of the program to be sure the function is enabled for the authority level assigned to the passcode in the Passcode Worksheet section of the program. • Check the Passcode Worksheet section of the program confirm the passcode is assigned to the area where you are attempting to perform the function. • Check the Passcode Worksheet section of the program to see if the passcode is restricted by a user window. • Check the Area Parameters section of the program confirm the area in which you are attempting to perform the function is turned on.

12.5 Phone Line

Phone line problems that are not corrected can choose the control panel to go into communications failure. The D9124 can be programmed to monitor one or two phone lines. Refer to the *D9412G/D7412G Program Entry Guide* for programming instructions.

If the phone line monitor is enabled, `SERVC PHONE LINE #1` (#2 if two lines are used) appears in the command center display when the control panel detects a problem on the phone line.

Table 19 identifies problems that can occur with phone lines and describes how to troubleshoot them.

Table 19: Phone Line

Problem	Diagnosis	Solution
`SERVC PH LINE #1` (or #2 if two lines are used) appears in the command center display.	The control panel phone line monitor detects a phone line as faulted.	• Verify the telephone cord is correctly connected to the phone jack and the control panel. • Verify the Ground Start Jumper is in the correct position. • If using a ground start phone line, verify a D136 relay is correctly installed in the Ground Start Relay socket. • Verify the phone jack (RJ31X or RJ38X) is wired correctly. The incoming phone line must be wired to Terminals 4 and 5. The in-house phone system must be wired to Terminals 1 and 8. • Verify all telephones are on-hook. Leaving a telephone on hold after the other party hangs up creates an off-hook condition. Verify there are no phones are on hold. • If completing the previous steps does not restore the phone line, meter the line. If your readings are below 3.0 VDC, contact your telephone company repair service.

12.6 Communication Failure

The control panel goes into communication failure after ten unsuccessful attempts to reach the receiver. Check *Table 19* in *Section 12.5 Phone Line* to verify there is no problem with the phone lines at the installation. If the phone lines are good, monitor the lines (preferably at the receiver) for the symptoms shown in *Table 20*.

Table 20: Communication Failure

Problem	Diagnosis	Solution
The line rings but the D6500/D6600 Receiver does not pick up. The Ring Indicator LED on the line card does not light. You cannot hear the ring with a headset at the receiver location.	Line is not ringing at the receiver.	• Verify the lines are correctly connected to the receiver. • Verify correct prefixes and phone numbers for the receiver are programmed into the control panel. • If completing the previous steps does not correct the problem, contact your telephone company repair service.
The control panel cannot call out when all 246 points are faulted.	The total current draw is too much for the control panel.	Put the command centers on a separate power supply for the maximum current draw from points in alarm.
The line rings but the receiver does not pick up. The Ring Indicator LED on the line card lights. You can hear the ring with test set at the receiver location.	Line card in the receiver may be faulty.	Review the receiver manuals for troubleshooting procedures.
The control panel reaches a busy signal for all ten attempts to reach the receiver.	• Calls are not reaching the receiver.	• Verify the correct prefixes and phone numbers for the receiver are programmed into the control panel. • Confirm the phone lines are not shorted between the phone company's equipment and the receiver by placing a call to the number for the receiver. If you hear the line ring and the ring detector does not light, or if you hear a busy signal and the green On Line (OL) indicator is not lit, call the phone company for service.
	• The receiver's call load is too great.	• Additional line cards and phone lines might be needed for the receiver.
The receiver answers the call and provides an acknowledgment tone, but the communicator does not transmit reports.	The receiver is not producing the correct acknowledgment tone.	Verify the receiver is producing a 1400 Hz, 2300 Hz, or Modem IIIa^2 acknowledgment tone.
The control panel does not connect to the central station.	The D136 relay used for ground start phone systems is inserted incorrectly.	Insert the D136 relay in the GND START socket correctly. Also, ensure the phone line is connected and the phone jack is wired properly. Refer to *Section 9.11.1 Relay Installation* for instructions.
The receiver answers the call and provides an initial handshake acknowledgment, but does not acknowledge the panel's report transmission with a kiss-off acknowledgment.	• The receiver is not compatible with the panel's transmission format.	• Make sure the receiver is compatible with the format the control panel is using (either BFSK or Radionics' Modem IIIa^2 Communications Format). See Phone in the *D9412G/D7412G Program Entry Guide*. • The D6500 Receiver requires MPU and Line Card EPROM revision 8.00 or higher, or use the D6600 Receiver.
	• Noisy phone lines are interfering with report transmission.	• Try making a voice call to the receiver on the line to verify the noisy condition. It might be necessary to have the phone company check the lines.

12.7 Points

If the switches on a POPIT are set incorrectly, it can create both missing and extra points. When a missing point is found, perform a Service Walk Test to search for extra points. See the *Owner's Manual* for test instructions.

Table 21 identifies problems with points and describes how to troubleshoot them.

Table 21: Points

Problem	Diagnosis	Solution
Point appears as missing at the command centers and in reports to the receiver.	• POPIT is not connected or incorrectly connected to the data expansion loop.	• Verify a POPIT Module programmed for the missing point number is connected to the data expansion loop of the correct ZONEX Module. Points 9 to 127 connect to ZONEX Module 1. Points 129 to 247 connect to ZONEX Module 2. • Meter each POPIT to verify the polarity of the data expansion loop. Voltage should be 9 VDC to 13 VDC at each POPIT.
	• D8128D OctoPOPIT is installed at the last address on the ZONEX bus.	• Install a D8125 POPEX and D9127 POPITs for points 121 to 127 on ZONEX 1 and for points 241 to 247 on ZONEX 2.
	• Sensor loop switch (1 to 8) is turned off on OctoPOPIT.	• If the sensor loop switch on an OctoPOPIT is turned off for a programmed point, the point reports as missing.
	• POPIT is not programmed correctly.	• Verify the switches on the POPIT are set for the missing POPIT number. Incorrectly set switches can cause both missing and extra POPITs. • Performing a Service Walk Test to search for extra points can help diagnose the problem.
Points intermittently appear as missing. Points are erratic.	Problem with data expansion loop. Debounce Count parameter set at 1. If an off-board point is in transition between normal and faulted conditions as the panel scans it, it appears as missing.	See the troubleshooting information in *Section 12.8 D8125 POPEX Data Expansion Loosp*. • Leave the Debounce Count at the default of 2. • Decreasing the Debounce Count to 1 can cause points to appear as missing. Increasing the Debounce Count can cause missed alarms.
One or more points remain in trouble or alarm with all devices connected to the sensor loops normal.	• The sensor loop is open, shorted, or grounded.	• Remove the sensor loop from the control panel or POPIT and meter it for continuity. There should be no more than 100 Ω resistance, plus the value of the EOL resistor on the wires. If you meter less resistance than the value of the EOL resistor, check the wiring for shorts.
	• Opens, shorts, or grounds cause troubles or alarms depending on point programming.	• With the wires for the loop removed, meter them for continuity to ground. A ground before the EOL resistor on an on-board point's sensor loop is interpreted as a short. A ground on a sensor loop for a POPIT point is interpreted as an open.
Faulted points do not generate alarms or troubles as programmed.	• The Sensor Reset was pressed when the alarm or trouble was generated.	• No action is required because during a sensor reset the control panel ignores input from all points in the same area that was programmed for sensor reset.
	• Two points are programmed with the same address.	• Points programmed with the same address do not function correctly. Confirm there are no duplicated point addresses.

Table 21: continued

Problem	Diagnosis	Solution
The control panel transmits PT Bus Trouble Reports. Erroneous alarm and/or trouble reports may follow a PT Bus Trouble Report. Erroneous alarm and/or trouble events for off-board points appear at command centers.	• There is a short on the D8125 POPEX Module's data expansion loop or short on control panel's ZONEX data terminals (25 and 26, or 27 and 28). A short on either the Data Expansion Loop or the ZONEX data terminals generates a PT Bus Trouble Report. While the short remains, the control panel responds as though the sensor loop for each point connected to the POPEX Module was shorted.	• Check the wiring for shorts.
	• The POPIT address switches are set incorrectly (for points 128 or 248) or the OctoPOPIT address switches are set incorrectly.	• Confirm all POPIT and OctoPOPIT address switches are set correctly. POPITs cannot be used for points 128 or 248, which are reserved for panel functions. D8128C OctoPOPITs cannot be used for points 121 to 128 or 241 to 248. D8128D OctoPOPITs cannot use points 128 or 248.
All off-board points are MISSING.	• There is a short on the Aux Power, Terminal 3 or ZONEX power, Terminal 24.	• Terminals 3 and 24 share a common circuit breaker. Check the wiring and devices connected to these terminals for shorts or grounds.
	• If only one POPEX Module is connected to the control panel, the POPEX Module might be incorrectly connected to the control panel or Data Expansion Loop might be disconnected from POPEX Module.	• Check the POPEX Module for correct connections to the control panel and the Data Expansion Loop. • If you find missing points, the Service Walk Test can help diagnose the problem (see *Extra Points* below).
Keyswitch points (P## Type is programmed as 4, 5, 6, 7, or 9) report as missing. If the area is armed, the point reports a Missing Alarm. If the area is disarmed, the point reports a Missing Trouble.	Point is disconnected from the SDI data bus. The POPIT cover might be removed and not replaced or the cover is not seated properly.	The point restores when the SDI bus is reconnected or when the POPIT cover is seated firmly on the POPIT.
The connected points show as extra points when the point bus is shorted beyond the programmed debounce time.	The points have no point index programmed.	This is corrected when the short returns to normal.

12.7.1 Extra Points

If the control panel is not in the Service Walk Test Mode when an extra point trips, it responds to the trip as a local Trouble event at the command center or central station (see the Routing section in the *Program Entry Guide*). The control panel shows the custom text for the point number set in the point's DIP switch or the on-board point location.

When an extra point is tripped during the Service Walk Test, it reports as an Extra point in the control panel's Event log and at the local printer (if installed). Once an extra point is identified, check the programming to see if it has a point index programmed. Then you can determine if the point index is appropriate for the application and the area assignment is correct.

12.8 D8125 POPEX Data Expansion Loops

Electromagnetic interference (EMI), excessive resistance, or intermittent grounds, shorts, or opens on the data expansion loop can cause erratic or intermittent functioning of points. If EMI is a problem, see *Section 12.9 EMI on Long Wire Runs.*

AC induction on the data expansion loops must be less than 1.0 VAC. If EMI is **not** suspected as the cause of the problem, follow the procedure in *Section 12.8.1* to find the source of problems on the data expansion loop. You can also use the *Zonex Point Identification Validation Process* (P/N: 43049) for a detailed procedure and worksheets to identify and validate all points.

12.8.1 Metering the Loops

Before performing the following procedure to meter the data expansion loops, check *Table 22* to verify the correct gauge wire was used for the length of the data expansion loops.

Table 22: Data Expansion Loop Wire Specifications

Maximum Length of all Data Expansion Loops Combined	
AWG	Length in meters (feet)
22	548 (1800)
20	881 (2890)
18	1402 (4600)
16	2231 (7320)
14	3551 (11,650)

When metering the loop, monitor it long enough to observe an intermittent problem.

To meter the data expansion loop without connected POPITs:

1. Disconnect the loop from the POPEX Module.
2. Twist the positive and then the negative wires together at each POPIT location so the positive and negative wires are continuous to the last POPIT location.
3. At the last POPIT location, twist the end of the positive wire to the negative wire to form one continuous loop.
4. Meter the loop for continuity from the point where it connects to the POPEX Module. Resistance for the entire loop must be less than 60 Ω. If there is no continuity, find and repair the open on the loop.
5. Still metering for continuity, untwist the negative and positive wires at the last POPIT location. If the meter does not show an open condition, find and repair the short on the loop.
6. Twist the positive and negative wires at the last POPIT location together.
7. Meter the loop for continuity to Terminal 10 (earth ground). If there is continuity, find and remove the foreign ground on the loop.
8. Meter the loop to Terminal 10 for AC voltage. AC induction on data expansion loops must be less than 1 VAC. Try using shielded cable to reduce AC induction if the AC voltage exceeds 1 VAC.

12.9 EMI on Long Wire Runs

EMI can cause problems on long wire runs for serial devices such as command centers and POPITs. Using shielded cable reduces the effect of this interference. Some potential sources of noise on a long wire run include:

- Radio or television transmitter site
- Amateur radio operator's transmitter site
- Computer network system
- Heavy machinery (large electrical motors)
- PBX telephone system
- High voltage electrical equipment or transformers such as arc welders, certain medical and dental equipment, and so on
- Public service office using radio communications (fire department and police department, and so on)
- Close proximity to electrical lines, telephone cabling, or fluorescent lighting fixtures

There are many other possible sources of noise. If noise is a problem, use shielded wire. Connect the drain wire from the shielded cable to Terminal 10 on the control panel.

The drain wire must have continuity from the control panel to the last device on the wire run. If the cable is cut to install devices between the last device and the control panel, make sure you reconnect the drain wire to insure continuity to the last device.

If continuity is not maintained between the control panel and the last device, the shielded cable can aggravate potential noise problems rather than eliminate them. Connecting the drain wire to ground at other than Terminal 10 on the control panel can also produce problems. Do not connect the drain wire to any other ground source.

12.10 Checking Shielded Cable

If improperly installed, shielded cable can create problems rather than solve them.

To check shielded cable for proper installation:

1. Remove the drain wire for the shield from Terminal 10.
2. Meter the drain wire for continuity to Terminal 10 (earth ground). If there is continuity, find and remove the foreign ground on the drain wire.
3. Reconnect the drain wire to Terminal 10.
4. Meter the shield at the far end of the cable (last POPIT location on data expansion loops) for continuity to a ground reference. If there is no continuity, find and repair the open in the shield. Solder and tape all connections.

12.11 Battery and Power Reports

You can program the control panel to transmit both Battery and AC Power Status Reports (see the *D9412G/ D7412G Program Entry Guide*).

If Battery or AC Power Reports are a problem:

1. Make sure the control panel power supply is not overloaded. Review *Section 7.0 Power Supplies* and S*ection 12.14 Overloaded Power Supply*.
2. Verify there is at least 16.5 VAC on Terminals 1 and 2. The outlet the transformer is plugged into should meter between 110 VAC and 120 VAC.
3. Confirm the output for the transformer connected to Terminals 1 and 2 is rated for 16.5 VAC and at least 40 VA.
4. Disconnect the transformer from Terminals 1 and 2 and meter the battery at Terminals 3 and 4. A fully charged battery shows approximately 13.8 V.
5. Make sure the battery is a 12 V sealed lead-acid type. It should be rated at 7 Ah or greater, depending on the NFPA classification of the installation.
6. If it takes longer than 60 seconds to detect a missing battery, make sure there is a good earth ground connection. Also make sure there are no external devices that can induce voltage.

12.12 Watchdog Reset Reports

The control panel sends a Watchdog Reset Report whenever the control panel CPU is interrupted and restarts its normal operating sequence. The on-board buzzer sounds briefly during the Watchdog Reset. The control panel returns to normal operation immediately after resetting.

The most common cause of CPU interruption and Watchdog Reset Reports is static discharge to the control panel. Static discharges may also corrupt the control panel's program. The D9124 displays `PARAM FAIL` at the command centers and sends a Param Cksum Fail Report if the program is corrupted.

Shorting Terminals 3, 6, 7, 8, 24, or the programming connector to ground can also cause a Watchdog Reset. Remove the short to continue normal operation.

A single isolated Watchdog Reset Report does not mean the control panel must be replaced. If experiencing frequent reports, contact Bosch Security Systems Customer Service for help.

Touch Terminal 10 first: If the on-board buzzer sounds briefly when the control panel is first touched, any static charge being carried is being discharged to the control panel. The control panel can generate Watchdog Reset and/or Param Fail events. Always touch Terminal 10 (control panel's earth ground connection) before beginning work on the control panel.

12.13 Runaway Reports to the Receiver

Using D8128 or D8128A instead of the D8128D OctoPOPIT Module can cause Runaway Reports to the receiver on AC failure. Make sure you replace all D8128 or D8128A OctoPOPITS with the D8128D Module.

12.14 Overloaded Power Supply

If the load on the control panel's power supply exceeds capacity, it follows a routine to protect itself and the battery. The control panel sends reports to the central station at several points during this routine.

Keep in mind the AC power remains at Terminals 1 and 2 throughout the scenario that follows:

- The control panel operates normally with a good battery, AC is present at Terminals 1 and 2, and auxiliary power load is under 1.4 A.
- The combined load on Terminals 3, 6, 7, 8, 24, and 32, accessory connector, and programming connector exceeds and remains above 1.4 A. Device failure or premises wiring ground faults may cause the increased load.
- The yellow Charging Status LED turns on, indicating the control panel is drawing on the battery to support the increased load.
- The battery begins to drain. When voltage drops to 12.1 V, the control panel sends a Low Battery Report and turns on the red Low Battery LED.
- When the battery drops to 10.2 V, the control panel disconnects it to protect it from deep discharge.

- If AC is still present, the control panel removes power to Terminals 3, 6, 7, 8, 24, and 32, and the programming connector to protect its power supply. The green Operation Monitor LED turns off, but the control panel continues operating.
- The control panel sends Battery Missing, Pt Bus Trouble, and SDI Failure Reports.
- If a D928 Module is connected, it begins sounding.
- After approximately 60 seconds, the control panel attempts to return to normal operation by returning power to Terminals 3, 6, 7, 8, 24, and 32, and the programming connector.
- If the overload condition is still present, the control panel removes power.
- The control panel attempts to return to normal operation approximately every 60 seconds.
- The cause of the overload is removed. The combined load on Terminals 3, 6, 7, 8, 24, 32, accessory connector, and the programming connector remains below 1.4 A.
- With the overload removed, the control panel returns power to Terminals 3, 6, 7, 8, 24, 32, and the programming connector. The control panel sends Pt Bus Restoral and SDI Restoral Reports.
- If a D928 Module is connected, it stops sounding.
- If the battery voltage is below 8.4 V, the control panel does not reconnect it. The battery must be replaced.
- When the battery reaches 13.7 V, the control panel sends a Battery Restore Report and turns off the red Low Battery LED.
- When the battery reaches 13.9 V, the control panel turns off the yellow Charging Status LED.

12.15 Service Walk Test

The Service Walk Test differs from the standard Walk Test. POPITs whose switches are set for a point number not programmed in the control panel appear in the Service Walk Test.

The Service Walk Test lets a user walk test all 246 points (`246 PTS TO TEST` also appears in the D9124 even though there are a maximum of 75 points available) from a panel-wide command center, regardless of the point index type. Service Walk Tests can also be initiated by account-wide or area-wide command centers, but only tests those points within the scope of the command center that initiated the function. The Service Walk Test does not test points in areas currently armed.

Fire and other 24-hour points do not transmit reports to the receiver during the Service Walk Test.

To perform a Service Walk Test:

1. Choose a command center to conduct the test. Make sure the display shows the idle disarmed text.
2. Press [MENU] to enter the Function List. Continue pressing [NEXT] until you reach the `SERVICE WALK ?` prompt.
3. Press [ENT] or [99] followed by [ENT] to open the Service Menu to access the Service Walk Test.

   The D9124 does **not** include the Service Walk Test in the Service Menu. Therefore, the D9124 must have the Service Walk Test function enabled in the Function List to access the Service Walk Test.
4. When `### PTS TO TEST` appears on the display, test the first detection device.

   As detection devices are faulted, the command center emits a brief tone and shows the point text of the point tested for 60 seconds. After 60 seconds, the display returns to the points to test message.

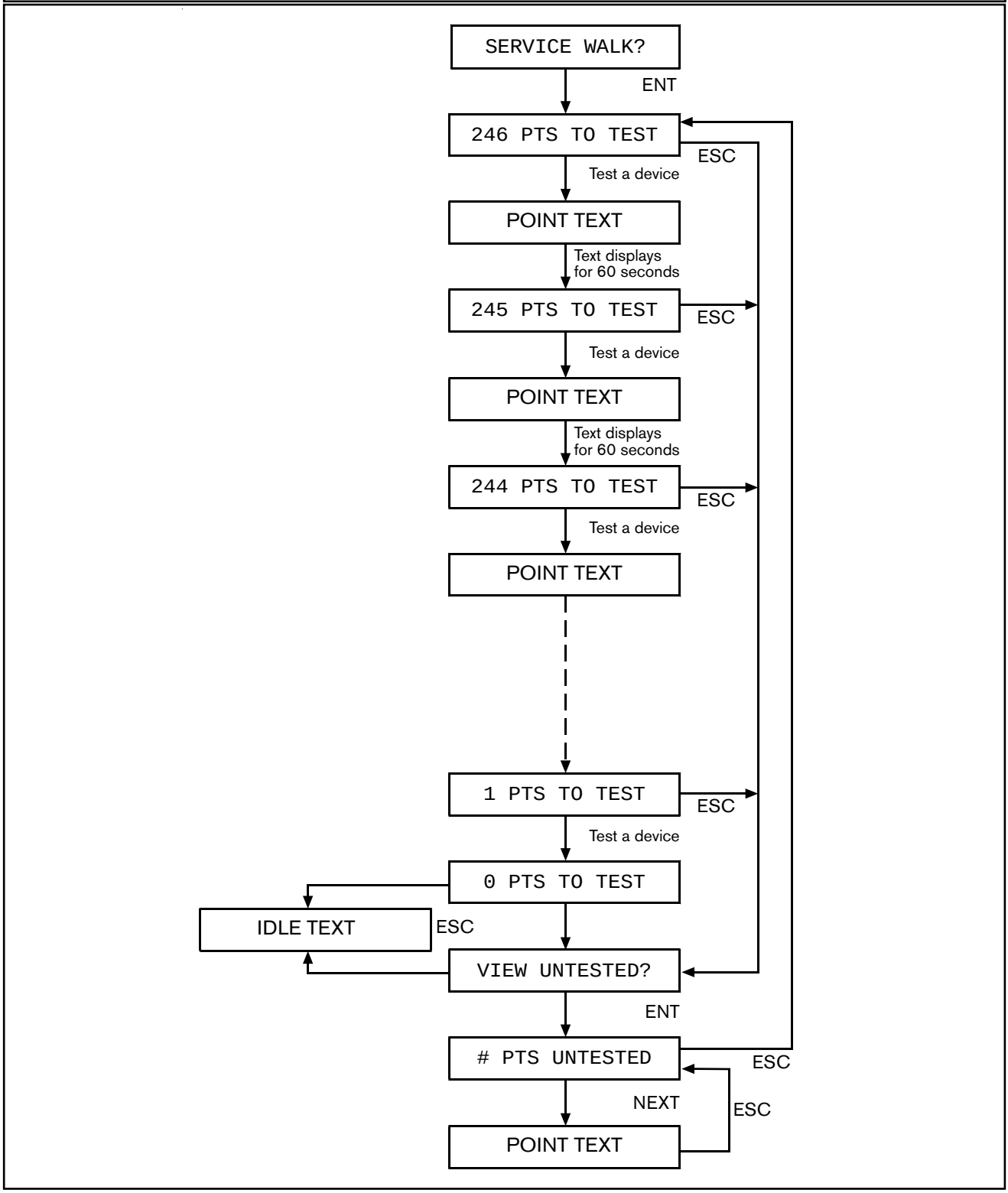
   Extra Points display default text: If the switches on a POPIT are set incorrectly to a point number not in the program for the control panel, the default text for that point number (`PT ###`) appears when the point is faulted. The *Program Record Sheet* shows the default text for all points.

   Faulting the point a second time produces the tone and displays the point text but does not reduce the PTS TO TEST count.
5. During the Service Walk Test, press [ESC] when the point text appears to see the points that remain untested. The display shows `## PTS TO TEST`.
6. Press [ESC]. `VIEW UNTESTED ?` appears.
7. Press [ENT]. The display shows `## PTS UNTESTED`.
8. Press [NEXT] to see a list of the points not yet been tested. Press [NEXT] to scroll through this list.
9. Press [ESC] to resume the Service Walk Test.
10. When `## PTS UNTESTED` appears, press [ESC].
11. The display shows `## PTS TO TEST`. You can resume testing points.
12. Press [ESC] twice to end the Service Walk Test.
13. After testing the last point, `0 PTS TO TEST*` displays. Press [ESC]. The display momentarily shows `ALL PTS TESTED` before returning to idle text.

*The Service Walk Test, when performed on a D9124, cannot show 0 points to test because it cannot physically connect to the second POPEX Module (used for points 129 to 247).

Automatic time-out returns the system to idle text: If there is no point or command center activity for 20 minutes, the Walk Test ends automatically. The command center returns to idle text.

Figure 26: Service Walk Test Flowchart



12.16 Ground Fault

If a D9124 System detects a ground fault, considered a high impedance fault to earth ground of approximately 100 kΩ or less, the control panel's command center shows SERVC GND FAULT. Use the following procedure as a general guideline in identifying and isolating the cause of the earth ground fault.

Read the following procedure carefully before trying to identify the cause of the ground fault.

12.16.1 Isolating Earth Ground Faults

Terminals 6 and 7 are not energized. Terminal 8 is energized.

To isolate earth ground faults:

1. With this safety measure in mind, first verify the ground fault is, or is not on the battery terminals (Terminals 4 and 5). Use a digital voltmeter (DVM) and a 13-in. jumper wire. As a reference point, when a D9124 Control Panel is not in a ground fault condition, a voltage reading between Terminals 9 and 10 is 6.5 VDC to 6.8 VDC.
2. Place the DVM on a DC volts scale. Connect the positive (red) lead of the DVM to Terminal 10 (earth ground) and negative (black) lead to Terminal 9 (common) of the control panel.

Stop if voltage reading is between 13.70 VDC and 13.88 VDC.

3. This voltage reading means the ground fault can be in one of the control panel power circuits such as the Battery, or Aux.

   Remove both battery wires from Terminals 4 and 5 simultaneously. If the voltage across Terminals 9 and 10 changes to 6.5 VDC to 6.8 VDC (indicating a normal reading), the ground fault is on the battery wire(s). Locate and remove the ground fault.
4. If the voltage across Terminals 9 and 10 still measures between 13.70 VDC and 13.88 VDC, reconnect the battery wire(s) back to Terminals 4 and 5 and go to Step 5.

Stop if voltage across Terminals 9 and 10 reads 0 VDC.

5. This voltage reading indicates the ground fault is on any of the control panels' common terminals. Remove both battery wires from Terminals 4 and 5. If the voltage across terminals 9 and 10 changes to 6.5 VDC to 6.8 VDC, the ground fault is on this battery is negative side. Locate and remove the ground. If voltage across Terminals 9 and 10 does not change, reconnect both battery wires to Terminals 4 and 5 and go to Step 6.
6. With the DVM still connected between Terminals 9 and 10, use *Table 23* to determine which terminal grouping has the ground fault.

Table 23: Terminal Grouping Ground Fault

If voltage at Terminals 9 and 10 is:	Ground fault is on Terminal:
0 VDC	4, 9, 12, 15, 18, 21, 23 (D9412G only), and/or 29, 6 and/or 7
approximately 1.7 VDC	6 and/or 7
approximately 2.5 VDC	11, 13, 14, 16, 17, 19, 20, and/or 22,
approximately 7.0 VDC fluctuating	30 and/or 31
approximately 7.6 VDC fluctuating	1 and/or 2
approximately 11 VDC to12 VDC	25 (D9412G/D7412G only), 26 (D9412G only), and/or 28 (see Step 5)
approximately 13.8 VDC	3, 5, 8, 24 (D9412G only), and/or 32

Terminals 6 and 7 are not energized. Terminal 8 is energized.

7. Once the voltage is determined, remove the wire(s) from the terminals listed and verify the voltage on Terminals 9 and 10 is approximately 6.5 VDC to 6.8 VDC. If the voltage does not measure within this range after removing the suspected wire, continue to check the remaining wires connected to the terminal group.

8. Verify the wire removed has an earth ground short by disconnecting the DVM and switching the DVM to read ohms. Attach the red lead of the DVM to the end of the wire that was removed (making sure the connection is on the conductor of the wire and not the jacket). Attach the black lead of the DVM to Terminal 10 of the control panel. If there is an earth ground short, the reading can range between 0 kΩ and 95 kΩ.
9. Continue troubleshooting the field wiring to eliminate the ground. Begin the process by starting in the middle of the wire run and checking which side of the wire run has the earth ground short. A known earth ground is needed for the test.
10. Once the earth ground fault is isolated, remove the ground, repair the wire, or replace the wire.
11. If the voltage reading represents a ground fault on Terminals 25, 26, or 28, the ground fault condition might physically be on either the ZONEX bus, POPIT bus, or an input point on an OctoPOPIT or POPIT.

To isolate the ground fault in this scenario:

- Disconnect the positive and negative leads to the battery or batteries.
- Connect the jumper wire from Terminal 10 to Terminal 9 for approximately 5 seconds.
- Points with a ground fault on the input loop change to an open state while Terminals 9 and 10 are shorted. **Do not** keep the jumper wire on Terminals 9 and 10 for longer than 10 seconds. Only use this procedure to track down ground fault conditions.

12.17 Panel Buzzer

Beginning with version 6.3 and higher, the control panel on-board buzzer pulses 1 second on, 1 second off if a supervised command center no longer responds to polls from the control panel. The buzzer is silenced when the supervised command center begins responding to polls again or by pressing [COMMAND 4] from an operational command center.

Appendix A: Determining Battery Requirements

A.1 Auxiliary Current and Standby Battery Requirements

A.1.1 12 VDC Device Calculations

Table 24: Determining Battery Requirements for 12 VDC Devices

		AC Power ON		AC Power OFF		In Alarm	
Model Number	**Quantity Used**	**Normal Current (each unit)**	**A Total**	**Minimum Current (each unit)**	**B Total**	**Maximum Current (each unit)**	**C Total**
All D9124 Devices[1]	1	410 x 1 =	410	412 x 1 =	412	874 x 1 =	874
D125B		20 x Quantity		19 x Quantity		123 x Quantity	
D129		25 x Quantity		25 x Quantity		26 x Quantity	
D192C		20 x Quantity		20 x Quantity		55 x Quantity	
D192G		35 x Quantity		35 x Quantity		100 x Quantity	
D928		18 x Quantity		18 x Quantity		100 x Quantity	
D1255		104 x Quantity		106 x Quantity		206 x Quantity	
D1256		104 x Quantity		106 x Quantity		206 x Quantity	
D1257		104 x Quantity		106 x Quantity		206 x Quantity	
D8125		48 x Quantity		47 x Quantity		48 x Quantity	
D8127		3 x Quantity		3 x Quantity		4 x Quantity	
D8129		20 x Quantity		20 x Quantity		20 x Quantity + 25 x the number of relays	
D8130		5 x Quantity		5 x Quantity		54 x Quantity	
D9131A		24 x Quantity		22 x Quantity		36 x Quantity	
Ratings of other 12 V devices (bells, horns, strobes, smoke, and/or heat detectors) in the system not listed above.							
		x Quantity =		x Quantity =		x Quantity =	
		x Quantity =		x Quantity =		x Quantity =	
		x Quantity =		x Quantity =		x Quantity =	
		x Quantity =		x Quantity =		x Quantity =	
		A Total =		B Total =		C Total[2] =	

All currents are in millamperes (1 A = 1000 mA).

[1]D9124 current draw includes one D9412GLTB Control Panel, one D1256 Fire Command Center, one D928 Dual Phone Line Switcher, one D8125 POPEX Module, and two D192C or D192G Bell Circuit Supervision Modules.

[2] If C Total exceeds 1900 mA, you can use a UL Listed external power supply to provide additional current. The devices requiring the additional current must be connected directly to the additional power supply that shares common with the D9124.

A.1.2 24 VDC Device Calculations

Table 25: Determining Battery Requirements for 24 VDC Devices

Model Number	Quantity Used	AC Power ON Normal Current (each unit) (mA x Quantity)	A Total	AC Power OFF Minimum Current (each unit) (mA x Quantity)	B Total	In Alarm Maximum Current (each unit) (mA x Quantity)	C Total
		x Quantity =		x Quantity =		x Quantity =	
		x Quantity =		x Quantity =		x Quantity =	
		x Quantity =		x Quantity =		x Quantity =	
		x Quantity =		x Quantity =		x Quantity =	
		x Quantity =		x Quantity =		x Quantity =	
		x Quantity =		x Quantity =		x Quantity =	
		x Quantity =		x Quantity =		x Quantity =	
		x Quantity =		x Quantity =		x Quantity =	
		A Total =		B Total =		C Total* =	

* C Total must not be greater than 4.0 A (4000 mA).

A.2 Standby Battery Calculations for Fire Alarm Applications

Calculate Standby Battery and Auxiliary Current first. You must calculate totals for columns B and C in the appropriate (12 V or 24 V devices) chart in *Section A.1 Auxiliary Current and Standby Battery Requirements* before you can complete the following calculations.

A.2.1 Calculations for D9412GLTB and 12 VDC Initiating and Indicating Devices

Central Station or Local Systems (24-Hour Standby)

Central station or local systems require 24 hours of standby plus 5 minutes of alarm operation at the end of the 24-hour period. A single battery is sometimes adequate for central station systems, but you must install two batteries to meet the basic standby requirements for a local system installation. You must use battery ampere hour (Ah) calculations to verify compliance. The formula in *Figure 27* includes the calculation for 5 minutes of alarm operation at the end of the 24-hour period, and a 10% contingency factor allowing for the depletion of battery capacity with age.

Remote Station or Auxiliary Systems (60-Hour Standby)

Remote station or auxiliary systems require 60 hours of standby plus 5 minutes of alarm operation at the end of the 60-hour period. A UL Listed power supply with additional batteries installed in a separate D9109 or D9109G enclosure may be required in the D9124 System to meet the basic standby requirements for a remote station or auxiliary system installation. You must use battery ampere hour (Ah) calculations to verify compliance. The formula in *Figure 28* includes the calculation for 5 minutes of alarm operation at the end of the 60-hour period, as well as a 10% contingency factor allowing for depletion of battery capacity with age.

Ampere-Hour Calculation Formulas

Use totals from *Section A.1.1 Calculations for 12 VDC Devices* (currents in millamperes).

The total Ah requirements must not exceed the Ah capacity of:

Two D126 Batteries = 14 Ah (14000 mAh)

Two D1218 Batteries = 34.4 Ah (34400 mAh) if using 17.2 Ah batteries and 36 Ah (36000 mAh) if using 18 Ah batteries

When connecting two D1218 Batteries to the control panel, both must have the same capacity (use two 17.2 Ah batteries or two 18 Ah batteries).

Figure 27: Central Stations or Local Systems Ampere-Hour Calculation Formula

Total B		Hours		Total C		Hours		Contingency		Total mAh
(_____	x	24)	+	(_____	x	.083)	+	10%	=	_____

Figure 28: Remote Station or Auxiliary Systems Ampere-Hour Calculation Formula

Total B		Hours		Total C		Hours		Contingency		Total mAh
(_____	x	60)	+	(_____	x	.083)	+	10%	=	_____

A.2.2 Calculating D9142 24 VDC Battery Capacity Requirements for Initiating and Indicating Devices

Central Stations or Local Systems Require 24 Hours Standby

To determine 24-hour standby battery capacity, first use the column labeled **Column B, AC Power OFF** (refer to *Tables 24* and *25*) to calculate the total 24 VDC current required. Next, use the column labeled **Current (A)** in *Table 26* to select the row with the current equal to or larger than your calculated total from the chart, **Column B**. To the left of this current value is the battery amp hour rating you need. This value already factors in a 5-minute bell current of 3 A at the end of the 24-hour standby period. If your standby current is greater than 1 A, subtract the current from the bell current. For example, you require 1.294 A of standby current so you need a 38 Ah battery, which recharges in 37 hours. The maximum bell current is (4 A to 1.294 A) = 2.716 A of bell current.

Table 26: 24-Hour Standby

	24-Hour Standby	
Battery A-Hours	Current (A)	Recharge Time (Hours)
7	0.136	10
12	0.322	10
14	0.397	11
17.2	0.517	13
24	0.771	18
36	1.219	34
38	1.294	37

Remote Stations or Auxiliary Systems Require 60 Hours Standby

To determine 60-hour standby battery capacity use the column labeled **Column B, AC Power OFF** (refer to *Tables 24* and *25*) to calculate the 24 VDC current required. Next, use the column labeled **Current (A)** in *Table 27* and select the row where the current is equal to or larger than your calculated total from the chart, **Column B**. To the left of this current value is the battery amp rating you need. This value already factors in a 5-minute bell current of 3 A at the end of the 60-hour standby period.

Recharge batteries within 48 hours after the fully-charged batteries are subjected to a single discharge cycle.

Table 27: 60-Hour Standby

	60-Hour Standby	
Battery A-Hours	Current (A)	Recharge Time (Hours)
7	0.030	12
12	0.105	12
14	0.135	12
17.2	0.183	14
24	0.286	18
36	0.467	27
38	0.497	29

Notes:

Appendix B: D9142 24 VDC Power Supply

B.1 D9142 Default Setting Features

B.1.1 Description

The D9142 is a supervised, 4 A, 24 V power supply that charges standby batteries and supplies power to auxiliary devices.

The D9142 connects to a dedicated circuit breaker. The 120 VAC input terminals on the D9142 are covered for added safety. The D1601 transformer is fused with a thermal non-resettable fuse. The transformer plugs into the D9142 using an input/output cable and provides AC power for the D9142 and a 16.5 VAC 40 VA output for powering the control panel.

D9142 supervises all stages of power for detection in case of a fault.

You can select which trouble events activate a supervision relay output. The relay output allows for a remote indicator of general trouble with the D9142 AC power, battery, or power output.

Battery Supervision

The D9142 offers low battery and missing battery supervision for both batteries.

When the battery drops between 22 VDC and 24 VDC or the battery is disconnected, the red Low Battery LED lights and the power supply triggers the Trouble Relay output.

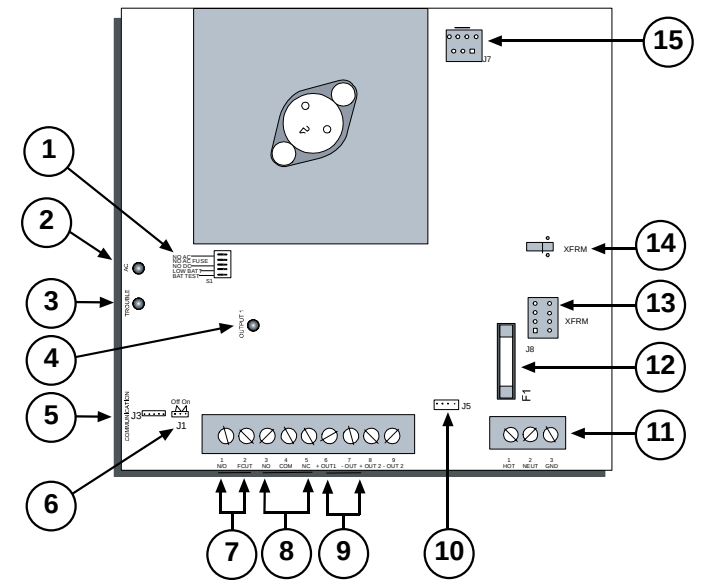
When battery voltage returns between 24.2 VDC and 26.5 VDC, the Low battery LED turns off. The D9142 resets the Low Battery Trouble output.

D9142 Status LEDs

The LEDs on the left side of the D9142 (*Figure 29*) indicate the:

- green LED lights when AC power is connected and applied to the D9142. Normally, this LED is on.
- red Power Supply Trouble LED lights when D9142 senses trouble. Normally, this LED is off.
- green Power Output Status LED lights when power output is powered on. The LED turns off when the output power is off.

Figure 29: D9142 Power Supply



1 - Supervision relay configuration DIP switch
2 - AC power LED (green)
3 - Power supply trouble LED (red)
4 - Power output status LED (green)
5 - Control panel output connector
6 - Switched output selection jumpers
7 - Switched output control
8 - Supervision relay output
9 - Auxiliary power outputs
10 - Remote status LED connector
11 - Covered 110 VAC connection
12 - Covered 110 VAC fuse F1
13 - D1601 transformer connector
14 - 16.5 VAC 40 VA power to control panel
15 - Battery connector

B.1.2 Default Trouble Output Settings

Five trouble conditions can activate the relay. See the Supervision Relay Configuration DIP Switch (S1) on the D9142 (*Figure 29*).

NO AC: 120 VAC power failure annunciation. Do not use for 24 V fire applications. The D9124 Control Panel provides this function.

NO AC FUSE: Fuse F1 failure.

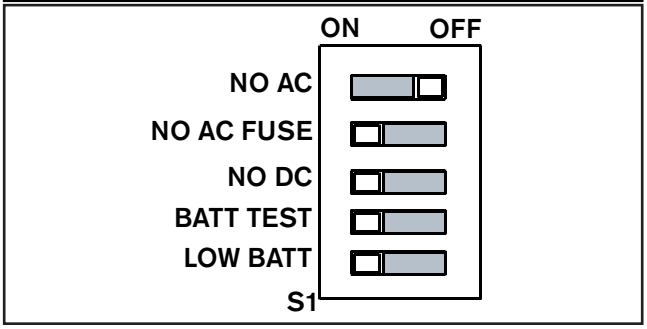
NO DC: Power output failure due to grounds or shorts on the output circuit.

BATT TEST: Causes fault if battery test circuit fails.

LOW BATTERY: Battery voltage low or battery missing.

The factory settings are shown in *Figure 30*.

Figure 30: D9142 Factory Switch Settings



B.1.3 Specifications

Table 28: D9124 24 V Power Supply Specifications

Power Input	Nominal: 120 VAC, 60 Hz, 360 VA
Power Outputs	24 V indicating and initiating devices with a minimum operating voltage greater than 18.9 VDC or a maximum operating voltage less than 28 VDC can be damaged or fail to operate. One Output: 4 A maximum DC Output Voltage (AC applied): 22 VDC minimum, 28 VDC maximum DC Output Voltage (No AC): 18.9 VDC minimum, 27 VDC maximum
Low Battery Voltage	Trouble Threshold: 22 VDC minimum, 24.1 VDC maximum Restoral Threshold: 24.2 VDC minimum, 26.5 VDC maximum
Load Shed	Voltage Trouble Threshold: 18.9 VDC minimum, 20.5 VDC maximum Voltage Restoral Threshold: 23.1 VDC minimum, 24.7 VDC maximum
AC Line Fuse F1	Type 3 AG: 4 A, 250 V Slow Blow. Bosch Security Systems (P/N: 57-01338-004)
Supervision Output Relay	Form C, rated for 2 A @ 12 or 24 VDC
Environmental Considerations	Operating Temperature: 0°C to +50°C (+32°F to +122°F) Relative Humidity: 5% to 85% at +30°C (+86°F) non-condensing
Batteries	Use the following 12 V sealed lead/acid batteries: 7 Ah, 12 Ah, 14 Ah, 17.2 Ah, 24 Ah, 36 Ah, or 38 Ah

Notes:

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